THE AMERICAN
GAS-LIGHT JOURNAL
AND
CHEMICAL REPERTORY.

Devoted to the Interests of Illumination, Heating, Ventilation and Sanitary Improvement, Domestic Economy, and General Science.

PUBLISHING OFFICE, No. 22 PINE STREET.

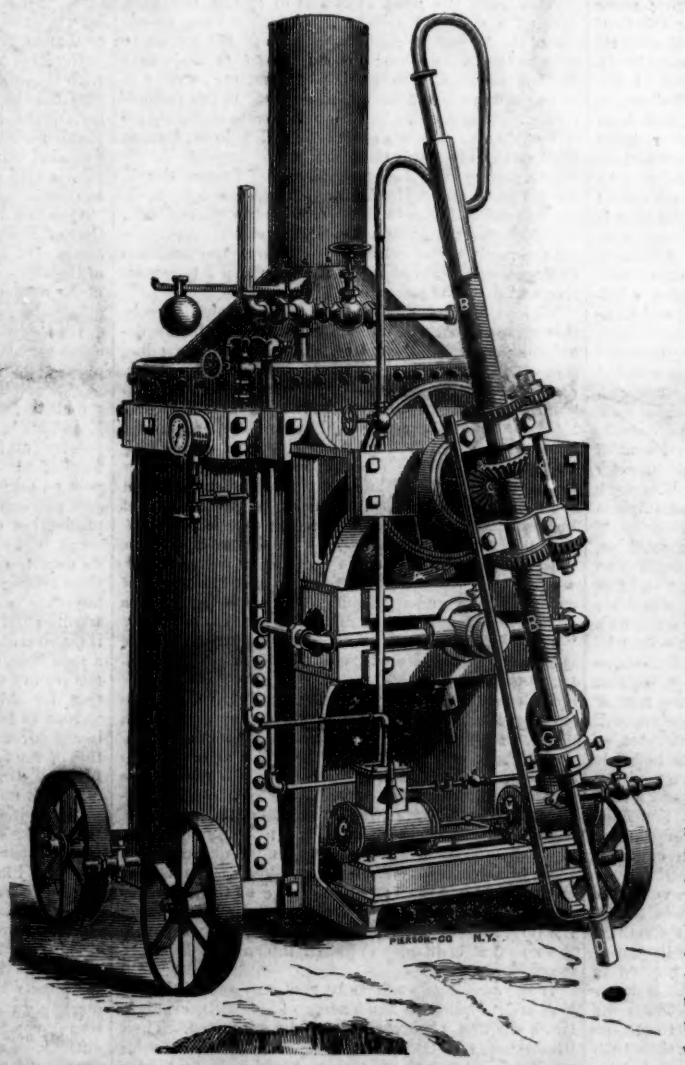
VOLUME X—No. 19. WHOLE No. 223 | NEW YORK, FRIDAY, APRIL 2, 1869. | $3 PER ANNUM IN ADVANCE.

Annular Diamond-Pointed Rock Drill.

This is one of those inventions remarkable for its simplicity and effectiveness, owing to the proper mechanical adaption of the apparatus to the purpose for which it was intended. And it is also one of those improvements which, when once seen, elicits the remark of surprise that it was not sooner thought of. All these years of probation, no one seems to have conceived the idea to use the hardest element known to cut and bore rock. Steel is good as far as it goes; but who would think of cutting glass with steel instead of the diamond?

Diamonds were first applied to rock drilling and adapted to the miner's art in 1860, by M. Rodolphe Leschot, a civil engineer, of Paris, France. Experiment taught him, that a rotating drill, set with diamond points, could be made to bore holes in rock to almost any depth, and with a rapidity and facility heretofore unknown, by forcibly injecting a stream of water through the hollow drill into the hole being bored. This water has the effect to soften the stone, and lubricate the diamonds and keep them from heating; and at the same time effectually remove the debris or borings as fast as they are made by the revolving drill. By his invention of an annular drill and with the diamond points, large holes can be produced by the cutting away but little of the rock, the core being quite perfect; thus economizing time and power, and a great saving in drills. Several years have been spent in perfecting the mechanical details and appliances to operate the drills most efficiently. The diamonds used are a cheap article of different colors, sometimes black, and having little value as precious stones.

Messrs. Severance & Holt, of Middlebury, Vermont, and 14 Wall street, New York, have, however, so far perfected the construction and arrangement of these drills that they are enabled to present a really valuable tool. The accompanying cut represents the style of drill in most common use; being a prospective view of the testing drill. The testing or prospecting drill is so called because of its extensive use in testing the character and value of mines and quarries, although it is, of course, adapted to a variety of other work, such as shafting, draining, well-boring and surface blasting.



ANNULAR DIAMOND-POINTED ROCK DRILL.

It consists of a small, upright boiler, to one side of which is firmly bolted the cast iron frame which supports the engine, swivel drill-head, gears and screw-shaft, as shown in the engraving. The engine—an oscillator of from three to five horse power—is shown at A. B is the screw-shaft with the drill passing through it. This shaft is made of hydraulic pipe from five to seven feet in length, with a coarse thread cut on the outside. This thread, a portion of which is shown in the cut, runs the entire length of the shaft, which also carries a spline by which it is feathered to its upper sleeve-gear. This gear is double, and connects by its lower teeth with the beveled driving-gear, and by its upper teeth with the release-gear, E. This release-gear is feathered to the feed shaft, F, at the bottom of which is a frictional gear fitting the lower gear on the screw-shaft, which has one or two teeth less than the frictional gear, whereby a differential feed is produced. This frictional gear is attached to the bottom of the feed-shaft, F, by a friction-nut, thus producing a combined differential and frictional feed which renders the drill perfectly sensitive to the character of the rock through which it is passing, and maintains a uniform pressure upon the same. The severe and sudden strain upon the cutting-points incidental to drilling through soft into hard rock with a positive feed is thus avoided. The drill proper (passing through the screw-shaft), consists of a tubular boring-bar, made of common gaspipe, with a steel bit or boring-head, D, screwed on to one end. This bit is a steel thimble about three inches in length, having three rows of black diamonds in their natural rough state firmly imbedded therein, so that the edges of those in one row project forward from its face, while the edges of those in the other two rows project from the outer and inner peripheries respectively. The diamonds of the first mentioned row cut the path of the drill in its forward progress, while those upon the outer and inner periphery of the tool enlarge the cavity around the same, and admit the free ingress and egress of the water as hereafter described. As the drill passes into the rock that portion of stone encircled by the annular channel is, of course, undisturbed, and passes up into the drill in the form of a solid cylinder. The sides of the hollow bit are one-fourth of an inch thick, and the diamonds of the inner row project about one-eighth of an inch, so that the core or cylinder produced by a two inch drill (the ordinary size for testing), is one and a quarter inches in diameter. Inside the bit, D, is placed a self adjusting wedge, which allows the core to pass up into the drill without hindrance, but which impinges upon and holds it fast when the action of the drill is reversed—thus breaking it off at the bottom, and bringing it to the surface when the drill is withdrawn. In order to withdraw the drill it is only necessary to throw out the release gear, E, by sliding it up the feed-shaft, F, to which it is feathered, when the drill runs up with the same motion of the engine which carried it down, but with a velocity forty times greater; that is, the speed with which the drill leaves the rock, is to the speed with which it penetrates it as forty to one—the revolving velocity in both cases being the same. The drill-rod may be extended to any desirable length by simply adding fresh pieces of pipe. Common gas pipe is found to serve admirably for this purpose, the successive lengths being quickly coupled together by an inside coupling four inches long, with a hole through the centre to admit the water. The drill

is held firmly in its place by the chuck at the bottom of the screw-shaft.

The small steam pump, C C, is connected by rubber hose to any convenient stream or reservoir of water, and also with the outer end of the drill-pipe by a similar hose having a swivel joint, as seen in the picture. Through this hose a steady stream of water is forced by the pump into the drill from which it escapes between the diamond teeth at the bottom of the rock, carrying away all the grit and borings produced by the drill. Where water is scarce or difficult of access, a spout is laid from the mouth of the hole to a tank or reservoir and a strainer attached to the connecting hose, so that the same water may be used over and over again with but little loss. This pump also supplies the boiler. A tunnel drill is also made much upon this same principle. It is light and portable, being easily wheeled about by one man, and will operate equally well whether the tunnel be three or eight feet high. It may also be quickly adapted at a very small expense, to a tunnel twelve or fifteen feet high, and will bore holes within three inches from the top or bottom, and two inches from the side walls. It is pronounced by miners the only perfect tunnel-drill ever built. It allows to drill at any angle of the horizontal arc thus described without moving the machine, and also to place the drill rod close up to the side wall of the tunnel. The drill head also slides up and down on an adjustable frame, enabling us to bore a perpendicular row of horizontal holes without incurring more than three or four minutes delay in adjusting the drill to each successive hole. Then the drill itself, with its feed-gears and sliding guide, may be turned completely round by simply loosening a nut on the back of the swivel-head so that the point of the drill shall describe a vertical circle at any angle of which it will bore equally well. The drill being used to bore short holes may be run much faster than the other; 600 revolutions per minute being a fair rate of speed. The feed may be varied at pleasure, and according to the hardness of the rock from 60 to 240 revolutions per inch; that is from two to ten inches per minute. The same advantages are secured by friction feed in this drill as in the larger one. Only one man is required to operate it under ordinary circumstances. The whole thing is balanced on its axle by depressing the handles, and trundled about like a wheelbarrow.

The speed of boring depends, of course, upon the hardness of the rock. The maximum speed at which it is found both safe and practicable to run a two-inch testing drill in rock of moderate hardness, is eight inches per minute. Greater speed than this is practicable but not economical, in view of the increased wear of machinery Holes two and a half inches in diameter have been bored by this drill in North River blue stone and Vermont marble, at the uniform rate of thirteen and one quarter inches per minute.

Three sets of feed-gears accompany each machine, the coarsest of which feeds the drill one-sixteenth of an inch at each revolution, and the finest one, 240th of an inch. From 400 to 500 revolutions per minute is a fair rate of speed. The gears are not changed except with decided changes in the character of the rock—the frictional feed, before mentioned, allowing the drill to strike the hardest rock, when boring at high speed, without injury. The finest feed is used only for boring flint or rocks of greatest hardness. The same machine will carry a drill of from one to five inches in diameter, as desired. The depth to which holes may be bored is limited only by the strength of the drill-pipe and the power of the engine. With light, steel pipe, and a five-horse power engine, a three-inch hole 1000 feet deep may be bored with ease. For holes not over 400 feet deep the ordinary gas-pipe, and four horse engine is found sufficient even in the hardest rock.

The peculiar shape of the boring-bit prevents the drill from running out of line; hence the hole bored, however deep it may be, is perfectly straight, and there is no friction of the drill against the rock. By means of the swivel drill-head, the drill may be pointed in any direction by simply loosening a nut, and it bores equally well at all angles. The diamond teeth are the only part of the tool which comes in contact with the rock, and their hardness is such that more than 1000 feet have been drilled by the same points with but little appreciable wear. The cost of resetting the diamonds so as to present new points is very slight, and no special skill is required for the operation.

The whole machine is so simple, both in construction and operation, that any intelligent mechanic can easily learn to operate it and make all necessary repairs. By means of this drill, mines and quarries may be thoroughly explored to any depth, and a continuous core exhibited, showing plainly the character and value of the ore and other deposits. But it is in the opening and working of mines, the sinking of shafts, and the driving of tunnel that the great value of this drill as a labor-saving machine is most apparent.

Its adaptation also to submarine drilling, and its great value in clearing channels and harbors cannot be overlooked. Special machinery has been devised whereby submerged rocks 80 to 30 feet under water may be drilled and blasted without difficulty.

Chemical Repertory.--No. 8.

APRIL 2, 1869.

11. On Some New Chemical Relations of Metallic Aluminum.

[The following is a condensed abstract of this subject, as presented to the American Association for the Advancement of Science, at the Chicago meeting last summer. Not having been present personally, I desire here to convey my thanks to Professor George F. Barker, of Yale College, who was the Secretary of the Chemical Section; for reading my paper for me. I shall resume this subject in an early future issue, having many further facts, of a pregnant kind, to bring forward.—H. W.]

The more important of the facts which led my investigations into this direction were observed in December, 1864; and some account of them was first offered at a meeting of the New York Lyceum of Natural History, in November last.

To render myself fully intelligible at this time (especially as no publication has been made by the New York Lyceum, or otherwise, as yet), it is necessary that I resume concisely the whole subject from the beginning

Aluminum, the most abundant of metals, has been deemed a chemical paradox. Though among metals one of the longest to elude isolation, and not known to exist in the native state; yet it is found to assimilate itself, when pure, with gold, platinum, etc., a class of metals always found native, and which varies diametrically from aluminum in their relations to electro-negative elements. My observations, as I believe, furnish the key to unlock this paradox.

In a paper in the *American Journal of Science*, March, 1866, I have shown that aluminum presents a parallelism to most *native* gold in its relations to quicksilver; both showing normally a powerful superficial repulsion for the liquid metal, while in both cases the addition of a trace of sodium converts the repulsion into a positive and powerful attraction.

The analogy holds good also in another point, namely that mere abrasion or incision of either metal, thus developing an artificial surface, shows immediate adhesion of the quicksilver to such new surface. Here, however, the analogy ceases, and in fact this adhesion is far more difficult to exhibit with Al than with Au, the former metal presenting the singular phenomenon of an extension of the lamina, which is passive or repellent to quicksilver, to some appreciable depth under the surface; while in the case of Au this lamina is but the thinnest possible film. Hence it is, probably, that the remarkable relations of Al to Hg escaped observation until my experiments with amalgam of sodium. Also, as I have remarked in the paper before cited, while Au is quickly penetrated by Hg at the points of contact, forming an amalgam; Hg, after being made to adhere to Al, either by rubbing, or by Na, is readily "wiped off again clean, as water may from glass." In this latter point the analogy of Al is stronger with platinum than with gold.

Both cast and wrought aluminum behave alike in these respects. If a piece of sheet aluminum, with edges freshly cut or broken, be instantly immersed under quicksilver, penetration of the latter at such edges generally commences at once, and proceeds rapidly; so that in a brief time the sheet *may be split* (either partially or wholly) into two; brightly enfilmed on their inner surfaces. The phenomenon is still more strikingly shown by bending sharply under quicksilver a piece of tolerably thick sheet aluminum. Sometimes at the first bend the metal, otherwise so tough, breaks short off, generally with a strongly marked laminated fracture, the two exterior layers parting along separate lines, so that brilliantly enfilmed internal surfaces are exposed.

If such enfilmed surfaces be now exposed to the air, best after wiping off the excess of quicksilver adherent, a singular phenomenon will be witnessed. Their brightness is instantly tarnished, and in a few seconds *an efflorescent growth appears*, so rapid as to be visible to the eye; this efflorescence being composed, as I have found, of pure hydrate of alumina, in the form of single threads and filamentary bunches. Under the magnifier, the growth of the feathery mass of slender curved filaments on such a surface of aluminum, is a sight of a very peculiar and unprecedented character. The moister the air the more rapid the action. The evolution of heat accompanying the combustion is readily perceptible to the hand; and, by certain modifications (sodium being used to effect a rapid enfilming), may easily be made intolerable thereto!

Two new and startling conclusions are thus forced upon us; which I shall put into the form of axioms or postulates of a new theory of the nature of aluminum; to wit:

1st.—Our ordinary or normal, and stable, form of aluminum is in reality correspondent to what is known as the "passive" (usually highly *unstable*) form of other metals (as the well-known "passive iron" for example); or, as I shall prefer to say:

The resultant of the forces that aluminum encounters when isolated; under ordinary conditions; places its surface in an *electronegative* state or *attitude* towards oxydizers.

2d.—Absolute *molecular* or *chemical* contact with quicksilver produces an extraordinary, unstable, and abnormal form, corresponding to the normal forms of sodium and potassium; or, as I would express it:

Quicksilver, by absolute contact, *induces* upon the surface of aluminum, that intensely active *electropositive attitude* towards oxygen and water, which we have hitherto known only as an attitude of the alkali-metals.

In my experimental investigation of this theory, the following questions and hypotheses have been examined.

Question 1:—Most essential of all; may it not be due merely to a very fine division or diffusion, as in an amalgam of Al?

A negative reply is inferable from the fact that fine division, otherwise, produces no such phenomenon; but a crucial test is to attempt to produce, what on this hypothesis should be producible, a solution or fluid magma of Al in Hg presenting the phenomenon. Neither with hot nor cold Hg. with or without Na, can any such solution or magma be obtained. In fact, even if the coating of Hg on the Al has an appreciable thickness, no action takes place, except at the edges of immersion. The penetration I have described, of Hg, between the laminæ of a sheet of Al, appears similar to that in Professor Henry's lead-syphon.

Question 2. Is the new phenomenon to be classed with those of the *pyrophori* (like iron reduced by H., Pb from the ignited tartrate, etc.) which burn spontaneously to anhydrous oxyds, independently of atmospheric moisture? Answered readily by enclosing enfilmed aluminum in jars of air previously dried by sulphuric acid and by chloride of calcium. It was found to remain bright for hours.

Question 3. Is the phenomenon then analogous to that of K and Na, when exposed to the air; and accompanied by the production of a hydrate? Ignition of the effloresced product in a glass tube, and collection of the condensed water, answered this question in the affirmative.

I infer from these facts, that unless we have here come upon an entirely new class of relations, destitute of any known analogies, we must conclude that Al in this new state corresponds with the ordinary states of the alkali-metals. The possibility of passive forms of K and Na is here suggested; and that of a permanently passive state of iron, corresponding to the ordinary form of Al. This latter possibility is not without support on other grounds; as analogies with other metals, and particularly the many recorded cases of accidental production of iron highly resistant to oxygen; insomuch that most chemists find it necessary to explain its usually rapid rusting, by suppositions of *voltaic* actions arising from lack of homogeneity, and so on; thus implying a belief in a natural highly resistant, if not wholly passive, form. I may add that the passive state, if discoverable, will doubtless be found inherent only in a *pure* iron, hardly attainable by the modes of manufacture in use; and suggest trials by modes analogous to that for Al, namely, by decomposition by Na of ferrous or ferric chloride or other haloid iron compound in anhydrous form. Pertinent hereto, is the consideration of the familiar modes of producing external passive films on commercial iron, involving voltaic conditions not at all understood.

Much time has been spent by me in testing the question of the existince of an amalgam of Al or of any real solvent action of Hg upon Al, but with negative results. Fine filings or scrapings of Al or *leaf* Al may be incorporated with Hg, by rubbing in a mortar into a pasty mass. This mass, however, does not exhibit the phenomenon of spontaneous combustion, simply because of the *complete* envelopment of each particle of Al by the Hg; all access of atmospheric moisture to the former being thus debarred. An experiment, remarkably confirmatory of the opposite internal and external conditions of Al, and in other respects highly curious, is made by simply throwing a piece of Al leaf upon a clean pool of Hg. Instant and powerful adhesion is manifested; the leaf flattening itself out just as a leaf of Ag would under the circumstances. This appears, however, to be due merely to the *cohesive* attraction of the two films of air condensed upon the two metallic surfaces; for no spontaneous oxidation of the Al ensues, after ever so prolonged contact. If now the edges of the leaf be simply *torn*, while lying on the Hg, at every such torn edge real *chemical adhesion* is developed, and a conversion of the leaf into a white powder of hydrate of alumina will commence, which will propagate itself, though *with extreme slowness*, across the whole. The slowness of change, in this case being clearly due to the fact that the action of the Hg is but through the excessively tenuous internal lamina of the leaf, which is not passive to Hg.

The inference might be made by some, that it will be necessary, to avoid presumed danger from spontaneous combustion, to keep Al and Hg carefully apart, at

least when in any considerable masses; but, for several reasons (though such precaution will actually be necessary on other grounds) little danger need be apprehended on the ground of *fire*. 1st. Because of the very high capacity of Al for heat. 2d. Because of the rapid development of an obstacle to the access of moist air, through the accumulation of the feathery hydrate. 3d. And most conclusive; through the quick dissipation of the exciting agent, the Hg, by elevation of heat. Enfilmed Al, when heated above ebullition of Hg, assumes a surface, which, while dull and metallic, is again passive.

Still, contact of Hg will be destructive, to a ruinous extent, to all articles made of Al; a conclusion from my observations of obvious practical and commercial importance.

Enfilmed Al in water produces but a slow effervescence, and the question occurs whether the insolubility of the hydrate interferes. Addition of sulphuric acid, however, does not set up any more rapid action; so that it seems likely that the intensity of the action in air may be due to cooperation of the free oxygen of the air.

CHEMICAL *EXCERPTA*.

The illuminating power of the gas furnished customers of the Manhattan Gas-Light Company, for the years 1867, 1868, and part of 1869.

	1867.			1868.		
	Min.	Max.	Av'ge.	Min.	Max.	Av'ge.
January	12.53	14.45	13 24	14.40	16.03	15.43
February	12.74	14 65	13.65	13.23	15.56	14.19
March ...	11.38	14.03	13.32	12.61	15.27	14.11
April....	11.98	14.54	13.36	15.33	14.17	13.79
May.....	13 06	16.09	13.74	13.35	15.90	14 59
June.....	12.85	15.44	13.44	13 79	15.20	14.65
July.....	12.60	14.72	13.88	13.51	15.20	14.09
August ..	13.56	14.76	14 14	13.53	14.78	14 08
Septem'r	13.99	14.45	14 20	13.42	14.96	14.21
October..	13.89	14.94	14.35	13 58	15.59	14.89
Novemb'r	14 14	16.56	15.20	15.24	16.0	15.46
December	13.26	16.23	14.92	15.12	16.29	15.43

1869.

	Minimum.	Maximum.	Average.
January.....	14.71	15.96	15.27
February.....	14.40	15.70	15 13

Photometric observations made upon the gas at the office of the Company, corner of Irving Place and Fifteenth street, during the current year.

1869. Date.	Day.	Time.	Thermo.	Candles.
January 12	Tuesday	1.30 P.M.	26° @ 35°	14.86
" 14	Thursday	1.30 "	25° @ 38°	15.93
" 16	Saturday	12.30 "	28° @ 33°	15.34
" 19	Tuesday	2 "	20° @ 29°	15.35
" 21	Thursday	2.30 "	25° @ 35°	15.48
" 23	Saturday	1.30 "	12° @ 30°	14.71
" 26	Tuesday	1.30 "	14° @ 28°	14.93
" 28	Thursday	1.30 "	24° @ 45°	15.96
" 30	Saturday	1.30 "	38° @ 50°	15.57
	Average for the month		.....	15.27
February 2	Tuesday	1.30 "	20° @ 28°	15.25
" 4	Thursday	1.30 "	25° @ 27°	14.40
" 6	Saturday	1.30 "	18° @ 38°	15.36
" 9	Tuesday	2.30 "	18° @ 36°	15 70
" 11	Thursday	1.30 "	40° @ 43°	15.03
" 13	Saturday	2.30 "	33° @ 57°	15.05
" 16	Tuesday	2 "	31° @ 43°	14.99
" 18	Thursday	1.30 "	30° @ 46°	15.16
" 20	Saturday	1.30 "	26° @ 36°	15 42
" 23	Tuesday	1.30 "	30° @ 45°	14 97
" 25	Thursday	2 "	21° @ 33°	15.27
" 27	Saturday	2 "	20° @ 25°	15.00
March 2	Tuesday	1 "	11° @ 30°	14 00
" 4	Thursday	2 "	25° @ 35°	16.79
" 6	Saturday	2.30 "	6° @ 29°	15.03
" 9	Tuesday	1.30 "	15° @ 40°	15.69
" 11	Thursday	2 "	25° @ 37°	15.48
" 13	Saturday	2 "	23° @ 50°	14.11
" 16	Tuesday	12 M.	26° @ 50°	13 75
" 18	Thursday	4 P.M.	17° @ 39°	14.47
" 20	Saturday	4 "	24° @ 43°	14.82
" 23	Tuesday	2 "	16° @ 37°	14.50

[The above interesting tabulations were furnished me, at my request by Mr. Sabbaton, the Engineer of the Manhattan Company. I may remark that the average standard which this company proposes to itself to maintain is that of a *fourteen candle* gas. It will be observed that their maxima have repeatedly reached sixteen candles.—H. W.]

Purification of Lighting Gas.

BY PROF. H. DUSSAUCE CHEMETS.

The epuration of lighting gas is naturally divided into two distinct parts, the physical and chemical epuration.

PHYSICAL EPURATION.

When out of the barrel in which the water and tar, which distil in the same time, are condensed, the gas carries off mechanically a notable quantity of these two products that it is important to eliminate, the pipes that it traverses have for essential functions to divide them, to cool them by putting them in contact with surfaces the temperature of which gives it that of the surrounding air, and lastly to deprive it by the condensed effect of rubbing and lowering of the temperature, from these substances that it carries off in a globulary state. When out of these pipes, the condensation is not complete, the column with coke has for object to complete that epuration. There the gas, obliged to divide itself much more, has all its particles in contact with a solid body, the action of which is increased by the running of a thin stream of water. That part of the epuration deserves a particular attention; the gas, when going out, must be deprived as much as possible of the tar, which by condensing afterwards in the vats, would render inactive the purifying substances they contain. A good physical epuration is the essential condition of an easy chemical epuration.

CHEMICAL EPURATION.

At that moment of the fabrication, the gas, deprived of water and tar, contains yet hydro sulphuric acid, ammonia and carbonic acid. The elimination of these bodies by chemical agents, constitutes the second part of the epuration. At first, it was believed that water would answer the purpose for the absorption of the ammonia, and a milk of lime for that of the hydro sulphuric and carbonic acids; but these means were found insufficient.

Elimination of the Ammonia.—The first innovation was the use of sulphuric acid to eliminate the ammonia. Where the solution is diluted, there are no bad results to fear relative to the absorption of the light hydrocarburets; but sulphuric acid, the tension of the vapour of which is null at that temperature, is carried off mechanically and attacks the pipes that it soon completely destroys.

The use of acids was abandoned when, in 1840, Mallet proposed metallic subsances; sulphate of iron, chloride of manganese and iron residuum of the preparation of bleaching powder. These bodies are, indeed, very active. A double decomposition takes place between the carbonate of ammonia of the impure gas and these bodies, it results chloride of ammonium, carbonate of manganese and of iron, and these bodies absorb the hydrosulphuric acid gas.

In this process the purifying subsances are contained in a series of washers disposed in cascade and to the number of three. The pipe which brings the gas dips almost one inch in the solution. A diaphragm, to operate a more perfect contact, divides the bulbs as soon as they arrive, and soon determines the deposit of the pre iptate in the bottom of the vat. The washers are provided with sucks which permit to examine from time to time the degree of saturation of the liquid. The disposition of the washers in cascade permits to pass the metallic solution from one to the other, in such a way that the lower box in which the gas enters after the saturation, receives the liquid from the second, that one from the third, which is then filled with a new solution. In this way, the elimination of ammonia is complete, and a part of the hydrosulphuric acid is fixed. The quantity of lime used for epuration of the latter is greatly diminished. Notwithstanding that advantage, this process has been abandoned, indeed to make the gas to rest in the solution of the salt, the pipe was to dip in the solution, and it resulted an increase of pressure on the retorts; the dissolution had to be very diluted, for if concentrated, the liquid was transformed into a muddy mass, through which the gas penetrated with difficulty.

Then a dry vat was invented, it was formed of sawdust impregnated with a dissolution of concentrated chlorides. Thus a porous matter was obtained which, placed on shelves, was easily traversed by the gas. This vat had three floors, each one carrying a layer of about 1½ feet of prepared sawdust. The gas arrives by the bottom, purified partly by passing through the lower shelf, and achieves its epuration in the two upper shelves. When the purifying substance of the lower layer is saturated, the passage of gas in that vat is stopped, the shelf is removed, to descend the two others from one floor, then a mixture of fresh substances is introduced in the upper shelf. This process removes all the ammonia from the gas

Several years ago, M. Cavaillon proposed, for the epuration of ammonia a process founded on the decomposition which takes place between the sulphate of lime and the carbonate of ammonia. For this purpose, he proposed to use a mixture of old plaster, sulphuric acid, and an inert substance as the tan; the price of the material was so cheap that this process was the most economical, if its activity had been the same, but it is not so.

The value of this process has been verified on a large scale, and the following results were obtained:

Time of the operation,	23 hours.
Quantity of old plaster used,	18 hectolites.
Ammonia existing in the gas by cubic metres,	6 grammes, 24.
Ammonia remaining in the gas after the passage on plaster,	2 grammes, 24.
Quantity of gas used,	11,910 cubic metres.

We see by these numbers that the third of the ammonia is not used. We do not say that this process is unapplicable, the contrary, but the purifiers must be increased, and the material must be often moistened, for it has been ascertained that the activity of the plaster increases with the quantity of water.

Another process, proposed by M. Poenot, and which appears advantageous in small gas works, consists in the use of sulphate of lead, residuum of the preparation of the acetate of ammonia. With that substance a durable epuration is obtained. Indeed, carbonate of ammonia transforms it into sulphate of ammonia and carbonate of lead, which on the influence of hydrosulphuric acid, is decomposed in carbonic acid and sulphide of lead, after a washing, which eliminates the ammmoniacal salt, the sulphide of lead, roasted to the red regenerates the sulphate. The chlorides of calcium and baryum are substances with which it is easy to obtain a complete epuration, and which are employed in the same manner as metallic salts. In these researches on the epuration of ammonia, MM. Arnou and Douard have arrived, six or seven years ago, to obtain a complete epuration, without the use of any agent, but water. Indeed, it is sufficient to place in the vats thick layers of sawdust moistened with water, to fix the carbonate of ammonia. The manipulation is the same as for metallic salts. The ammoniacal waters resulting of the washing of the material, are afterwards treated in the apparatus of M. Mallet. A practice of several years has confirmed the economical results of this new process.

Elimination of the hydro-sulphuric acid.—Lime being the best commercial substance which ought to fix the choice of the manufacturer, it is the one which is yet used in many works.

The apparatus which were used to eliminate ammonia were at first adjusted for the elimination of hydrosulphuric acid; a thick milk of lime, placed in a series of washers provided with stirrers moving all the time, washed the gas while passing through diaphragms.

The inconveniences due to the increase of pressure, made the manufacturers to abandon this mode of washing, to substitute it by an Archimedes screw working in the middle of the milk of lime. That apparatus played at the same time the part of stirrer and exhauster. But the use of lime in that form always required the help of a motrice force, and it was abandoned for the dry epuration.

We have seen that to eliminate ammonia, they used sawdust impregnated with metallic salts and placed on shelves. The same was done for the lime, only sawdust was substituted by a layer of moss five inches thick, on which slack lime was spread.

The use of lime without doubt fulfill all the conditions of a good epuration; but in large cities its use is impossible on account of the enormous work resulting from it. Another more advantageous process was to be found.

The process proposed by M. Laming is remarkable for its elegance and its extreme simplicity. The product he uses is the hydrated peroxide of iron, $Fe^2 O^3$, HO. All the play of the operation rests on the property that possess the peroxide of iron to give, by its combination with the hydrosulphuric acid. a sulphide corresponding to the oxide. We have, indeed,

$$3HS + Fe^2 O^3 = Fe^2 S^3 + 3HO.$$

If we expose afterwards to the action of the air, the sulphide thus formed, it attracts the oxygen. The sulphur is displaced, and the metal alone is oxidized, in reproducing the primitive body, the hydrated peroxide.

The peroxide is the residuum of a preceding operation, and is obtained as follows: The works which used metallic salts for the epuration of ammonia, substitute for the chloride of manganese, the sulphate of iron. Take some sawdust and mix it with 80 pounds of sulphate of iron coarsely powdered, then pass a current of steam in the mass. The dissolution is operated and the sawdust is fully impregnated. The carbonate of ammonia of the gas, by passing in this mixture, is transformed into sulphate and disengages carbonic acid. After the washing to exhaust the sulphate, it remains oxide of iron in a very divided state which passes rapidly to the state of peroxide. Repeat twice the additions of 80 pounds of sulphate of iron, and then we accumulate in the saw dust from 12 to 15 per cent. of oxide. Then, before using the substance thus prepared to eliminate the hydrosulphuric acid, add to it 1-10th of slack lime, which helps the revivification, at the same time that it decomposes the little quantity of sulphate

of iron formed during the oxidation to the air. In that state it is carried in the vats, and when taken out from red it has become back; the sulphuration is accomplished. It is thrown on the floor in a place where the air circulates freely, and from time to time it is stirred with a shovel to renew the surfaces. The action is rapid, heat is developed, and a few hours after it comes back to its primitive red color.

After five or six months a new addition of lime is made, and the service begins again. The same substance can purify for eighteen months. The advantages of that system are too evident to recall them. It is necessary to tell, however, that hydrosulphuric acid alone is removed, and that carbonic acid remains in the gas—a great inconvenience—for when the gas is poor by itself, that acid lowers its lighting power in a very sensible manner. But nothing is more simple to remedy it in a cheap manner. It is to place after the oxide vats another vat with one or two layers of lime, which absorbs the carbonic acid. When the lime is carbonated it is sufficient to throw it in a retort, the decomposition of the carbonate is operated and the remaining product can be used again.

The system of direct epuration has for its object to distribute the gas by isolated pipes in vats having no communication with each other, then after transversing a single vat, it passes in the gasometer; when the lead paper presented to a stream of gas indicate the presence of hydrosulphuric acid, the vat must be changed. However, the action of the substance is not entirely exhausted as we shall see. This process is worked with a stronger pressure than in the methodical system.

This process has in the first the advantage to resume the work, by submitting to the revivification only substances which are completely inactive. Thus, instead of surrendering in the gasometer after its passage in a single vat, the gas passes first in a very old vat (18 to 22 hours' duration); then in a second more recent, lastly in a new vat (four to six hours' duration) which complete the epuration. The value of each of these vats, at least the two oldest, has been determined, and the following tables give the results. We must say that each one contained 15 hectolitres of purifying substance with oxide of iron. The total
was 15,000 cubic metres for every 24 hours.

First Vat (Old).			Second Vat.		
Age of Vat.	Hydrosulphuric acid by every cubic metre.		Age of Vat.	Hydrosulphuric acid by every cub. metre.	
	Before the Vat.	After the Vat.		Before the Vat.	After the Vat.
18 h.	7 grms. 34	6 grms. 63	12 h.	6 grms. 63	1 grm. 54
24 h.	7 grms. 17	7 grms. 01	13 h.	7 grms. 01	2 grm. 01
20 h.	5 grms. 20	4 grms. 38	12 h	4 grms. 38	1 grm. 33
22 h	4 grms. 50	3 grms. 65	14 h.	3 grms. 65	2 grm. 07
Mean.	6 grms. 04	5 grms. 40	Mean	5 grms 40	1 grm. 78

The third vat, that which complete the epuration commences to let to pass the hydrosulphuric acid only after about six hours; at that time, by the aid of the distribution they, it becomes the second and is substituted by another one filled with new material. At the time this change is operated the first vat is suppressed, and the substances are revivified.

We see by the comparison of the quantities of hydrosulphuric acid before and after each vat, that in the system with three vats the first is nearly inactive after 18 hours, and the second is yet very active after 15 hours—that is after a double time from that it has begun to let pass the hydrosulphuric acid; in the direct epuration, the vat being suppressed when the lead paper becomes black, we loose then in manipulation all the benefit of the work it is yet susceptible. The methodical epuration is advantageous and can be done with only the vats.

The combined processes of MM. Mallet and Laming are sufficient for a good epuration. The improvements to bring in that part of the fabrication, consist principally in the reduction of the manipulation; also we must insist on the use of an apparatus which has had for a long time only a secondary importance; the column with coke primitively destined to condense the tar. The action is helped by a regulated running of pure water or weak ammonia and water, the degree of which is increased by the dissolution of the ammonia of the gas.

But what is the chemical part of that water? In what proportion is absorbed the carbonate of ammonia? Is that ammoniacal water on account of its alkalinity fixes the hydrosulphuric acid, and if so, is it a disengagement of carbonic acid which thrown back in the gas alterates its lighting power? Lastly, is the mechanical action of the water nauseous by a too great condensation of hydrocarburets? These questions have a great interest, and we give the numbers collected, and which show what can be expected from water as a purifying agent.

Action of the Ammoniacal Water on the Ammonia of the Gas.

From the mean of six analysis the gas contains by cubic metre—

Before the passage 6 grms. 96 of ammonia.

After the passage, 2 grms. 01 of ammonia.

We see that there is a diminution of near of the two-thirds.

Action of the Ammoniacal Water on the Hydrosulphuric acid of the Gas.

Six analysis demonstrate that one cubic meter contains in mean—

Before the passage, 7 grms. 32 of hydrosulphuric acid.

After the passage, 2 grms 46 of hydrosulphuric acid.

Action of the Ammoniacal Water on the Carbonic Acid of the Gas.

The mean of seven analysis gives for the preparation of carbonic acid the following numbers.

Before the passage, 8 litres 71.

After the passage, 6 litres 00.

Thus for ammonia and hydrosulphuric acid, the action of water is very precise; it is not the same for carbonic acid. Whatever, these results are certainly remarkable, and show what can be expected from the combination of several apparatus working together. The essential condition to fulfill is to produce the washing, with the less water as possible. If the quantity is too large, there is condensation of light hydrocarburets, and loss in the lighting power. It is not changed in the contrary in the above conditions, as shown by photometric experiments.

The New York Society of Practical Engineering.

[*Reported Expressly for this Journal.*]

We publish in this number a condensed report of the two last meetings of this society as a pressure of other matter prevanted the publication of the former meeting in our last issue.

The meetings were held on February 16 and March 2, at room 26 Cooper Institute. At both of these meetings the president, James A. Whitney, occupied the chair, and William B. Harrison was recording secretary.

At the former meeting the subject for discussion was "Steam Plowing in England and America." The author of the regular paper of the evening, Dr. A. W. Veall, treated of the history of steam plowing, and the different plans which have been tried, both in this country and in Europe. He also spoke of the advantages possessed by our own country in view of its fertility, climate, etc., and remarked that the steam plow was the one thing now needed to complete our success in an agricultural point of view. The various propositions which have been made to secure the adoption of steam tillage were classified by Dr. Veall into four divisions. 1st. Those in which the plows are propelled in the same manner as locomotives. 2d. Those which refer to plans in which rotating spades perform the office of tilling and propelling. 3d. Those which relate to plans in which plows are drawn back and forth across the field by means of a rope wound around drums or pulleys. 4th. A proposition originated by the author himself, which relates to a plan in which a simple portable engine, of about fourteen horse-power, is provided with a set of traction pulleys, over which passes a wire rope, the ends of which are securely anchored at opposite sides of the field. It was claimed for this device that it would, in travelling unceasingly and much faster than horses, plow more in one day than twelve teams of horses and twelve men. The English plan, which comes under the third class of propositions, employs two locomotives of greater power and more expensive than the one proposed in the above plan. These engines are placed at opposite sides of the field, and each one draws the plows alternately, while the other pays out rope. The use of this plan is attended with great expense, loss of power and constant wear of the rope

After a discussion upon this subject, the meeting adjourned.

The second of these meetings was devoted to the consideration of "The Practical Aspects of Aerial Navigation," and after a few introductory remarks by the president, a paper on that topic was read at the request of the author, Dr. A. W. Veall.

The writer first made a few remarks concerning the light in which aerial navigation is popularly regarded, observing that those who have had the audacity to avow belief in its practicability are regarded as visionary. Aeronantical societies are, however, now being formed in the European countries, and the opinion of the public is being influenced by their doings The various attempts which have been made to bring the science of aerostation to a more perfect state of development were then passed in review, and the different experiments of ancient and modern times were noticed as to the part which they played in the progress of the science. The records of the ancients, however, are so full of exaggeration and fable that no reliance can be placed in their statements. Their attempts seem to have been mainly directed to the construction of flying machines to be impelled through the air similarly to birds. In modern times the Jesuit Francis Lama seems to have given the first notion of a balloon in 1670. Various other experiments followed, and many were made on a magnificent scale, but we omit the details. Leather, wicker work supporting a lining of paper, and other materials, were employed for the construction of balloons. Hydrogen, which was discovered in 1766, was thereafter employed for the purpose, but great difficulties were at first experienced in its employment on account of its tenuity. The writer then spoke of the uses to which aerostation could be put if ever brought to complete success. A new plan, which he claimed would accomplish these purposes, was then explained. The essential requisites of a good aerostat were detailed, and the manner in which this invention would fulfil these requirements was described. He claimed; first, that the shape of the balloon should be changed: second, that it should be furnished with a propeller by which its movements might be readily controlled; third, the power should be applied in such a manner as to prevent oscillations in the car; fourth, safety should be provided for, in view of accident; fifth, means of ascent and descent should be furnished without expenditure of gas and ballast; sixth, proper means for effecting a landing should be furnished; seventh, provision or allowance must be made for the expansion of the balloon. In conclusion, the writer expressed his faith in the practicability of aerial navigation, and also in the probability of its being hereafter adopted.

After an animated discussion the meeting adjourned.

TUESDAY EVENING, March 16.

"Submarine Engineering, and its Modern Practical Adaptions," was the chosen subject for the evening discussion; and a paper upon the subject, prepared by Prof. William Robinson, of Spring Valley, was read before the meeting. In his introduction, the author spoke of the peculiar difficulties attending the operations of this branch of science, as being one of the causes of that interest which is manifested in this direction by engineering of the present time. Owing, also, to the fact of its operations being conducted under water, and thereby under great disadvantages, additional interests are doubtless awakened which would perhaps not otherwise be felt. Another cause of interest springs from the desire for recovery of treasure lost by the sinking of vessels, etc. Various are the practical uses to which this branch of engineering may be adapted, such as the removing of obstructions from harbors, the laying of sea walls, and foundations of peers, etc., and in time of war, the construction of submarine defences. The author referred to the early history of the subject, and to the time when, before the discovery of the diving bell, this branch of engineering was limited to the energies and achievements of professional divers alone. The exact time of the discovery of the diving bell is not given in history, but we are informed of its employment or that of a similar device, as early as 1538, when two Greeks, in the presence of Charles V., of Spain, descended to a great depth and came out dry. The diving bell, in its early history, was impractical at depths where the water pressure was very great. Steps were taken to remedy this evil about the year 1642, but not until the latter part of the seventeenth century was it brought into general use; and about this time William Phillips, an American, succeeded in securing from the wreck of a Spanish vessel in the Bahamas, $1,500,000 of treasure. At a still later day the diving bell was again improved by placing the control of the bell in the hands of the divers, instead of the operators above The diving bell was employed in its first regular engineering operation by Smeaton, in repairing the foundation of the bridge over the Tyne at Hexham, Northumberland, in 1799. Many are the improvements subsequently made on the diving bell, but withall it is yet unmanageable, and is still susceptible of many additional improvements. Experiments of divers in armor-suits were described in connection with operations which have been carried on for years in the effort to regain treasure lost by the sinking of the frigate Hussar, near Hell Gate, during the revolution. A modern apparatus for submarine exploration, known as the "Nautilus," has been patented by Major Sears, of New York. An improvement on this invention, by Ryerson was used in opening the channel between Brooklyn and Govenor's Island. A still later invention, known as the "Submarine Explorer," and which is now being used in the operations conducted upon the wreck of the frigate Hussar, is the invention of William Mowstroms; and it is said that it withstands the current, notwithstanding its great rapidity and force in that location and that it operates with efficiency at a depth of eighty feet. In conclusion, the author described a contrivance called a "Combination diving-bell and boat," and invented by a prominent civil engineer of New York City. In this apparatus, a "working compression chamber" is employed for retaining a supply of air under pressure, and

also a ballast chamber for containing water ballast and stone or solid ballast. When it is desired to sink or lower the diver, the ballast is applied, and for raising it, the water ballast is expelled from the ballast chamber by admission of air from the "working compression chamber." This device is also provided with a pneumatic sub-tube for excavation purposes.

The reading of the paper being ended, an interesting discussion followed; after which, the society adjourned until its next regular meeting.

Correspondence.

[Correspondents in all cases should sign their communications with their names and address in full, not necessarily for publication, but as a guarantee of good faith.—Eds.]

The Bursting of Water Pipes.

New York, March 18, 1859.

Messrs. Editors: In answer to your invitation, page 257, current volume, I give here my opinion, based on experiments made.

Professor Barthelemy is in error when he denies that water in solidifying suddenly expands. Water deprived (by means of boiling and the air-pump) of all gas in solution, will also be able to burst a bottle; that (when placed outside a window) the rupture of the bottle will take place at the hottest side, viz, near the window is simply caused by the fact that the water on this side freezes last of all, and is therefore entrapped by the ice previously formed; that part of the bottle it is in contact with, undergoes the pressure during the solidification and consequent expansion of this entrapped water, while at other parts of the bottle the ice previously formed during its expansion simply could displace the non-congealing water. So that this fact rather proves than disproves the expansion during congelation.

When water did not expand on becoming ice, this substance would not be specific lighter than water, and not float on it, but this it does always; ice perfectly solid and free from any trace of air bubbles is 1-14th part lighter than water, therefore of a floating piece of such ice thirteen parts will be submerged out of every fourteen; but, as usually, ice contains a considerable amount of air bubbles, it is often one-eighth or one-sixth lighter than the water, and thus, of course, submerged for a proportional lesser amount.

Sometime ago an English savant asserted that ice expanded when cooled to very low temperatures; this opinion was based on the observation that a bombshell filled with water, and which had not burst by the freezing of all the water, finally did burst when cooled to below 0° Fah. But the cause of this bursting was simply that the cooling and contraction of the iron shell was previous to that of the solid nucleus of ice; it became therefore at very low temperature too small for the ice ball contained in it, till the cold had penetrated the ice and contracted it also; ice being a poor conductor of heat, an ice ball will be slow in contracting by cold to its very centre.

This observation induced me to make some experiments on the contraction of ice by cold, and I found that ice possesses its greatest volume at 32° Fah., and then contracts by cooling like most other bodies*, but never, even at the lowest temperature experimented on by me (20° below 0°), reaches the volume of the water from which it was formed. I subjoin here a table of the specific gravity of water and ice, adopting water of 32° as unit.

Temperature.	Volume.	Spec. Gravity.
Water at 212 deg.	1.0430	0.9587
" 194 "	1.0354	0.9656
" 176 "	1.0285	0.9723
" 158 "	1.0222	0.9783
" 140 "	1.0166	0.9836
" 122 "	1.0118	0 9883
" 104 "	1.0075	0 9925
" 86 "	1.0041	0.9959
" 68 "	1.0016	0.9984
" 50 "	1.0001	0.9898
" 48 "	1 0000	1.0000
" 39¼ "	0.9999	1.0001
" 32 "	1.0000	1.0000
Ice at 32 "	1.0526	0.9500
" 20 "	1.0520	0.9505
" 0 "	1 0516	0.9509
" —20 "	1.0514	0.9515

The experiments were made by the hydrostatic balance, weighing of ice in petroleum, benzine, ether, etc., the contraction and specific gravity of the liquid used, for every temperature employed, having been determined before-hand by means of the specific gravity bottle.

It is well known that experimentors disagree as to the specific gravity of ice at 32 deg. The oldest experimenter, Musschenbroe found it 0 083, Kraft and Heinrich, 0.905,; Osan, 0.927.; Irvin, 0.937; Williams, 0.965, and Dumas, 0.950. This may be simply accounted for that the ice was not entirely free from small air bubbles; Dumas took the precaution of taking perfectly solid and transparent ice, and he found the greatest specific gravity, which perfectly agrees with that found by me. I had to be very particular about the air bubbles, as a single one would destroy all reliability; the ice was formed from distilled water, first boiled and placed in vacuum, and then in a closed vesset, exposed to the cold without access of air. In this way perfectly solid small blocks of ice of about a cubic inch in size were obtained.

It is seen from the table that ice contracts from 32° to 20°, or for 52°, 0.0015 or 1-666th part, which gives for 180°, or a range of temperature equal to that from the freezing to the boiling point of water about 1-200. Comparing this result with the statement of Bruner, who found 1-177, and Silliman 1-257, it is about the mean between these two statements.

This is the experience in volume, the linear expansion being one-third of this, will be 1-600; after Heinrich it is 1-407, for 180° Fahr.; that means that so far as his observations went, it expanded at a rate which would give that result for 180°. Comparing this with the linear expansion of iron, which is 1-800, of copper 1-500, and of zinc 1-340; the amount of expansion of ice is between iron and copper, or between copper and zinc.

However, it must be remarked, that the rate of expansion end contraction differs at different temperatures; water is a striking illustration, as the above table shows; in general the rate of expansion increases when the temperature of a solid comes near its melting point, or of a liquid comes near its point of ebulition; even the ice shows this to a certain degree, as becomes evident from the above table, the expansion being about six times greater between 20° and 30° as it is between—20° and 0°.

Bruner has observed the linear expansion of ice from 21° to 32° Fahr., and found it to be at the rate above stated. Silliman states that it had been observed from —10° to 32° Fahr. I have not accomplished much more, having only experimented to—20°, but my experiments tolerably well verifying the main point in question, viz., the expansion of water in freezing, independent of any air, and the contraction of the ice formed, by further cooling.

P. H. Vander Weyde, M. D.

* The only exceptions to this rule which have come under my observation are India rubbers and iodite of silver, which expand by cooling and contract by heat; also water between 32 deg. and 40 deg. See above table.

Inspector of Gas and Meters.

Ohio, March 6, 1869.

Messrs. Editors: In relation to the laws of this State for inspection of gas and meters, I think it is clear that there has been "*too much* legislation" for the benefit of consumer or producer. Secs. 30 to 33, Act of March 3d, 1853, gave City Councils full power to regulate the price of gas and rental of meters; also to *compel* the laying of pipes and the supply of gas at *their* price, under penalty of forfeiture of charter, and erection of new gas works by the city, or their appointees, "the same as if the gas company had never been created." And further, "*they shall* appoint gas measurers, to inspect meters, *and certify to the correctness of all bills*, and such other duties as assigned them."

Such power in the hands of bad men would be ruin to any gas works, and you would suppose consumers and legislators would be satisfied; but no, although City Councils (with few exceptions) have sensibly refrained from exercising such mischievous powers, and thus proving them unnecessary, the legislators of 1865 and 1867 must try their hands, and issued their abortion, which you published February 16th.

I will not in this letter refer to the Act of 1853, but turn again to the Report of 1867. Dr. Wormley states (page 6) that he made 20 experiments to prove his "foot" measure, only four were satisfactory; there was between two of these four, 29 grains of difference. This, mark you, with all the appliances at his command. And he says, truly enough, that the reason why no two experiments resulted the same, was from "changes in the conditions, after the experiments were begun." This shows the difficulty of testing accurately, even at Columbus, and seems to point the utter impossibility of doing so where nearly all the requisite conditions would be wanting. Again (on page 11), he says he cannot determine how to meet the numerous requests of cities to report on she quality of gas delivered them, which he says "would require a photometer, and a room specially fitted up for investigation of this kind; even if a room were furni-hed, it would be impracticable to carry the State photometer to the various towns and cities of the State, this instrument being very large and cumbrous. * * * Moreover, these investigations, to be of any practical value, should extend over, at least a period of some weeks; and thus it would require the State to furnish, at least, several photometers."

Is not this, together with the fact that only Cincinnati has supplied a "room," a fact that the law is useless and inoperative in this feature. Again, take a city of 6000 or 7000, 150 consumers, taxes already 3 to 3½ per cent., can it afford to fit up a room suitable for testing gas? And if so, how is the deputy to be paid—is he only to receive fees for meters? If so, then but few with the *requisite qualifications* will be willing to serve. The law says, "they shall be as fully qualified as the State Inspector." There is no provision that I see for their payment; and like the State Inspector at present, will likely remain unpaid. Now, the appointment of a deputy at $2000 per annum (little enough for a man with the *requisite qualifications*), would entail on this city (like the majority in this State) as great expense as our whole municipal organization: if the gas works pays it would take the whole dividend; if consumers, then over $1 a month each. What then do we? Why like every other city in the State, except one we do without, and the law is useless.

We know that gas works sometimes send out gas not well purified, but not from choice; occasionally it cannot be avoided, and we have to ask indulgence of our customers. But small gas works in this State live only at the will of the cities where located (as I can show by reference to the Act of 1853), and there is, nor can be, any fear of imposition on consumers. Like every other business, self-interest is a powerful check, and the sooner people understand that we work on, with the full knowledge that our operation is dependent on their will, and our prosperity on satisfying them, by the supply of a good light at reasonable prices, and the sooner legislators inform themselves of our relative position to each other, and cease to give birth to such stupid abortions, the better it will be for all concerned.

Another item bearing on the subject, in the Journal of 16th inst., deserves notice. Mr. Stimpson, of Mass., reports "91 *reinspected*," 40 of which were incorrect, how far is not stated, perhaps not materially, but still faulty, and whoever thoroughly studies a meter will understand its liability to derangement, and consequent variation; but the same study will show them that the chances are greatly in favor of the consumer gaining thereby. Like the gas they should be often inspected, but not by a State officer, at enormous trouble and expense. The means of knowing if their gas is pure, and their meters approximating correct registry, should be in the consumers' hands; and if our legislators had drawn up the plan of preparing "test" papers, and passed a law compelling gas companies to publish the same, on the back of each gas bill, together with the simple mode of testing a meter in place with a five foot burner, I cannot but think they would have given consumers a protection far superior to the law in question. I sincerely hope your article of 16th inst. will be the means of awakening a combined action of the gas companies of this State to get the Act repealed.

Yours respectfully, Ohio.

Gas Commissioner of Ohio.

Ohio, February 26, 1869.

Messrs. Editors: I am glad you devoted a little space in your issue of the 16th to the law creating the office of Gas Commissioner of Ohio. It is only another useless clog on gas works—worse than the Federal taxes, which at least help to pay our national debts, while this burthen is utterly useless, except to create a little "patronage."

There are some 40 or 50 gas works in Ohio, with the single exception of Cincinnati; all are asked to send their meters, old and new, to Columbus, for inspection. Say only 20,000 meters are set and reset in Ohio annually, and $1 each be expended in testing the same, there is an aggregate expense of $20,000, which is an impediment to the gas business to that extent. The number inspected have not reached the figures here given, simply because the law is not complied with; but the estimate of $1 each meter is low, when the items which go to make it up are figured in their order, thus—I send a case of meters to Columbus, and I pay for packing, cartage, freight, cartage, unpacking, inspection (fee), then repacking, cartage, freight, and unpacking, so the estimate is low. If the meter makers deliver meters at Columbus, they add on "nine per cent. for inspection expenses."

Now for this cost, where is the commensurate gain? I affirm that instead of gain, there is loss to both consumer and gas company, and for proof I take the Annual Reports of the Commissioner for 1867-8, which show clearly that although a few (513), say five per cent. of all examined have been rejected, 95 per cent. of old and new, wet and dry, have proved correct, and the five per cent. (including some which would not pass gas) rejected, showed as great a discripancy *in favor of the consumer*, as they did to the companies. Hence I say, these reports show that the law is useless and uncalled for, so far as the meters are concerned, and ought to be repealed.

I will endeavor to show it equally useless in its provisions for quality, etc., if you intimate in your next issue that such communication is desired.

Yours respectfully, Ohio.

A Problem to be Solved.

TIFFIN, OHIO, February 26, 1868.

Messrs. Editors: A circumstance occurred here recently, which can be recorded if you think it worth space, and if you can solve the question, "What is it?" I shall be glad, perhaps others may have *silently* passed through the same difficulty.

Three or four weeks since, my nose informed me that our gas was very bad, and I concluded that the purifiers had been neglected, as the smell indicated the presence of sulphuretted hydrogen. Being Saturday night I could only make verbal inquiry, and the men disclaimed any neglect; my test papers of acetate of lead showed no impurity, while the pungent odor from inlet and outlet pipe of gasholder was very bad. Sunday morning I went to work to find out what was wrong; suspecting my test papers, I tried the gas with nitrate of silver, litmus paper, both red and blue; saturated some water and added sulphuric acid, etc., etc., the whole round of tests that I knew, and all told me the same story, while my nose (and after complaints of customers) told me the gas was very bad. I then applied myself to the purifiers, opened all and could find only one thing unusual or wrong; the lime instead of being colored yellow, or green, was purely white and red (little darker than the stamp on this envelope), white on top, and reddening until it reached the iron tray, where it was intensely red, showing clearly that the iron of the tray readily combined with the impurity. The only relief I have found, is in changing the purifiers twice as often as usual. I am very desirous to know the nature of the impurity, which must have been from the coal; although close examination failed to discover anything unusual.

Push along the matter of taxes on gas—let us have action taken as quickly as possible. One of the brethren, in your issue of the 16th inst., seems to think there is a desire to form a "ring." I have only seen the expression of a desire to have a large ring of gas companies make an effort to rid themselves of this unjust discrimination. Yours truly, MACHINIST.

[Will some of our gas experts please explain this phenomenon?—EDS.]

A Bill for Regulating Gas Companies.

Messrs. Editors: A bill has been introduced into the Massachusetts Legislature, entitled, "A bill for the regulation of gas companies and the better protection of consumers of gas, providing for the appointment of inspectors of gas in cities and towns, where there are more than five hundred consumers, whose duty it shall be to test the gas once every twenty-four hours; and that gas of less than sixteen candle illuminating power shall not be merchantable."

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Your obedient servant,
CHAS. CLAPP, Jr., Treas.

What Oil Meal is Composed of.

PENN YANN, N. Y, March 3, 1869.

Messrs. Editors: In answer to yours of the 1st inst., I will state that the *oil meal* we use is from *flax seed*, after the oil has been taken from it. I will also state that for a short time we were out of oil meal, during which time our gas gave a very bad and strong scent, but on our using the oil meal again it soon disappeared, all through the same process of purifying with lime.

The purer the oil meal is, so much the better. In this part of the State we have oil meal manufactured from pigeon weed, cockell, and other kinds of seeds; but that manufactured from flax seed is the best.

Yours truly, C. C. MASTEN,
Sup't Penn Yan Gas-Light Co.

Fodell's System of Bookkeeping.

The following subscriptions to "Fodell's System of Book keeping for Gas Light Companies" have been received, making in all 58:

O. H. Butler, Maiden Lane, N.Y.
George Wood, Mellville, N. J.
I. N. Stanley, Gas Eng'r, Brooklyn, N. Y.
John C. House, Waterford Gas Co., N. Y.
J. W. & J. F. Starr, Camden Iron Works, N. J.
Robert G. Jordon, Wheeling, West Va.
Wm. Cartwright, Sup't Oswego Gas Works, N. Y.
George A. Dyer, Main street, Ellsworth, Me.

Smedberg's "Synopsis of Gaslighting."

The following subscriptions to the above work is acknowledged, making in all 205:

John Kirkham, Logansport, Ind.
Robert G. Jordan, Wheeling, West Va.

To Purify a Room.—Set a pitcher of water in a rrom, and in a few hours it will have absorbed all the respired gases in the room, the air of which will become purer, but the water utterly filthy. The colder the water is, the greater the capacity to contain these gases. At ordinary temperature a pail of water will contain a pint of carbonic acid gas and several pints of ammonia. The capacity is nearly doubled for reducing the water to the temperature of ice. Hence water kept in a room a while is always unfit for use. For the same reason the water from a pump should always be pumped up in the morning before any of it is used. Impure water is more injurious than impure air. The above, if true proves how exceedingly careless many of us are as regards our health for we venture to say that a large majority of the people use water for drinking which has "absorbed" for hours the noxious gases of their rooms. Much care is requisite to preserve health.

Gas Question.

MONEY HELD AS DEPOSITS BY NEW YORK GAS COMPANIES.

ALBANY, March 10, 1868.

Three of the New York gas companies have responded to the resolution of the House requiring them to inform the Legislature as to the amount of money they hold on deposit from consumers. The Harlem Company report that they hold $12,843 of deposits over $3,000 of which were received from parties who have left the city and ceased to burn gas. The Metropolitan Gas Company report $117,197, which they claim as all they have to secure them for $170,0000 due the company. The Manhattan Company report their deposits at $230,-578. These amounts do not represent as much as was supposed. Mr. Mitchell, the chairman of the special committee investigating the affairs of the gas companies, is preparing a bill based upon the testimony taken, which, it is said, will be perfectly fair both to the interests of the consumers and the gas companies. It will not be presented until the investigation, which will be resumed on Saturday, is completed.

FURTHER INVESTIGATION BY THE LEGISLATIVE COMMITTEE IN BROOKLYN.

The committee resumed its inquiry March 10th at 10 o'clock, Mr. Mitchel presiding.

Mr. Valentine T. Wall, Secretary to the Old Brooklyn Gas Light Company, stated that the company's stock at present was $2,000,000, and in case they had to replace their capital now it would cost them $4,000,-000; their charge for gas was $3 25 a thousand; its light was equal to that of fifteen candles; sometimes went as high as eighteen or nineteen; the dividend for the past four years averaged about seventeen per cent.; he repudiated an assertion made by a customer, a few days ago, as to his being exhorbitantly charged by the company.

Mr. P. Libby, of the Citizens Gas Company, gave account as to price of gas dividend, etc., and said that inferiority in gas may arise from local obstructions; and opinion prevailed in Europe, as well as in America, that a gas company was in itself a monopoly; in Glasgow, where the illuminating power was equal to thirty candles, there was also a cry against monopoly; such a thing as gas monopoly did not exist, it being more ideal than real.

Charles T. Catiltine, of the Citizens' Gas Company, and Charles F. Blodget, of the Williamsburg Gas Company, were also examined, and gave testimony as to the past and present condition of their companys. The Williamsburg company charged $4 per thousand for gas, and this large price was attributable to the fewness of customers.

The chairman announced that the committee would meet in Brooklyn at 7½ o'clock on Saturday evening, to hear the complaints of customers.

Prices of Gas Coals—March 27.

PROVINCIAL.

	Duty, $1 25 Coarse. Gold.	Slack. Gold.
Block House	$1 75	$0 75
Gowrie	1 75	0 75
Lingan	1 75	0 75
Sydney	2 13¾	0 71½
Pictou	2 13¾	1 18¾
Little Glace Bay	1 75	1 00
Caledonia	1 60	0 75

AMERICAN.

	Coarse. Currency.	Slack.
Westmoreland Co.	$8 50	$8 00
Despard Coal Co.	8 50	8 00
Penn	8 50	8 00
Newburgh Orrel Gas.	8 50	8 00
We t Fairmount Gas Coal		7 00
Powelton Gas Coal	8 00	7 00

Delivered in New York.

PRICES OF FOREIGN COALS—DUTY $1.25 PER TON.

Liverpool Gas Caking	$ 9 50
" " Cannel	14 00
" House Cannel	18 00@19 00
" " Orrel	16 00@18 00

Per ton 2240 lbs., Ex. ship.

PRICES FROM YARD.

Liverpool House Orrel, scr'd	$16@$18
" " Cannel, scr'd	18@$22

Per ton, 2000 lbs. delivered.

A vein of Bituminous Shale, which burns like cannel coal, has been discovered near Elko, on the Central Pacific Railroad. It forms an excellent fuel for steam purposes, and as it is apparently inexhaustible, with every prospect that the quality will improve, its value can hardly be overestimated. The deposit is not more than a mile and a quarter from the railroad; and it is found in a region where wood is selling at $10 per cord, and is not abundant at that price. The cost of mining and delivery on the line of the road will be about $4 per ton; and it is estimated that one ton of this shale or coal is equal in value to two cords of wood of the quality sold in the same region. Thus, in the place of two cords of wood at $20, the Railroad Company will obtain the same amount of fuel for steam purposes at $4. In view of the immense requirements of the road, the difference will be a most important item.

ARCHER & PANCOAST M'F'G CO.

Manufacturers of

GAS FIXTURES,

Coal Oil Lamps, Chandeliers, Etc.,

Of Every Description.

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212) NEW YORK.

P. P. DEILY, J. FOWLER.

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39 LAUREL STREET, PHILADELPHIA, PENN.,

BUILDERS OF GAS-WORKS,

MANUFACTURERS OF

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WROUGHT IRON ROOFS,

CHARGING-SCOOPS, COAL WAGONS,

COKE BARROWS, AND ALL WROUGHT

WORK CONNECTED WITH GAS-WORKS.

Particular attention paid to the Extension of Works and Repairs to Gas-Holders, Purifiers, Etc. Also, Builders of Water Tanks, Oil Tanks, Oil Stills, Etc.

REFER TO M. H. Jones, Easton Gas Co., Penn.
Franklin Woolman, Burlington Gas Co., N. J.
O. W. Goodwin, Camden Gas Co., N. J.
Benjamin Acton, Salem Gas Co., N. J.
Dr. Marcy, Cape Island Gas Co., N. J.
W. F. Warner, Owego Gas Co., N. Y.
E. Wilcox, Joliet Gas Co., Ill.
Messrs. Woodbury, Walter & Potter, Kalamazoo Gas Co., Michigan.
H. H. Fish, Utica Gas Co., N. Y.
W. J. Ball, Terre Haute, Indiana. (221-1yr.

GAS-WORKS FOR SALE.

WE, THE UNDERSIGNED, PROPRIETORS OF the Gas Works of this place, on account of being desirous of engaging in business at some other place, offer the works for sale on liberal terms. The Works are in good running order. Tamaqua, Pa., is a thriving business place in the coal region. There is in construction a new railroad to pass through this place, intersecting with the Lehigh Valley Railroad. For further information relating to the same, apply to German, Zehner & Co. 4t

TO GAS COMPANIES.

A YOUNG AND ACTIVE MAN DESIRES A situation as Superintendent of a small Gas Works. He is acquainted with machinery practically, and has had some experience in the details of gas making, distribution and meters. Can give the best of reference. Would take a situation as Assistant Superintendent, if desired. Address, "S," care of AMERICAN GAS-LIGHT JOURNAL 222-tf

NOTICE.

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WILL BE READY ON OR ABOUT THE 10th INST.

The Price to others than original subscribers will be $5.

OREGON IRON FOUNDRY,

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CASTINGS FOR

GAS WORKS

OF ALL DESCRIPTIONS, INCLUDING

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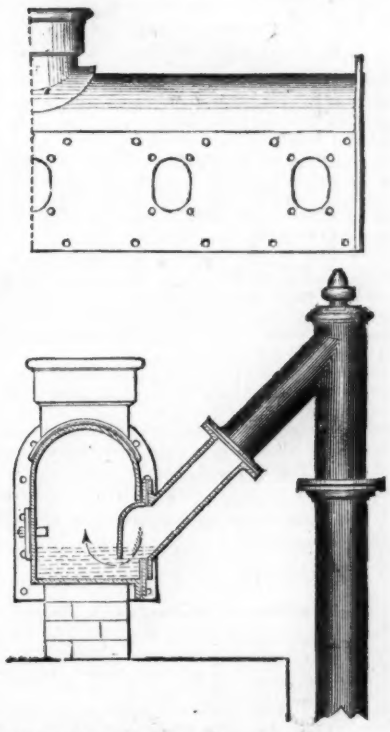

Floyd's Patent Adjustable Main.

FOR BENCHES OF 1, 2, 3, 5 and 6 RETORTS.

By the removal of the front plate only the Main can be adopted to Settings of any number of Retorts desired. The Patent Main can be applied to the ordinary D shaped Main. It offers great facilities for cleaning, and is not liable to stoppage.

FLOYD'S PATENT

Malleable Iron Retort Lid.

SABATTON'S PATENT

Furnace Door and Frame.

REFERS TO—J. A. Sabattan, Esq., Engineer Manhattan Gas Co—Col. A J. White, Metropolitan Gas Co.—C. C. Mowten, Engineer New-York Gas-light Co.—J. Mowten Saunders, Engineer Baltimore Gas Co.—John T. Harrison, Engineer Savannah Gas Co.

.86] HERRING & FLOYD, Proprietors

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PORTABLE GAS WORKS.

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A GENERAL AGENCY FOR THE SALE OF THE CELEBRATED

Springfield Gas Machines.

So well and favorably known throughout New England. Illustrated Circulars giving full particulars, with references to the NATIONAL ARMORY OF THE UNITED STATES,

At Springfield, Mass., which is now lighted with this Apparatus of a thousand burner capacity; and some others who are using these Machines, will be mailed upon request. Address

COVELL & CO.,

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A MIDDLE-AGED MAN OF BUSINESS HABITS for many years engaged in Machinery, particularly that connected with Gas and Water Works, Plumbing and Gas-Fitting, about starting on a Tour through the Western States, will act as Agent for anything in the above line. Undoubted reference given. Address Box 1,513, P. O., New York. 219-2

A Problem to be Solved.

TIFFIN, OHIO, February 26, 1868.

Messrs. Editors: A circumstance occurred here recently, which can be recorded if you think it worth space, and if you can solve the question, "What is it?" I shall be glad, perhaps others may have *silently* passed through the same difficulty.

Three or four weeks since, my nose informed me that our gas was very bad, and I concluded that the purifiers had been neglected, as the smell indicated the presence of sulphuretted hydrogen. Being Saturday night I could only make verbal inquiry, and the men disclaimed any neglect; my test papers of acetate of lead showed no impurity, while the pungent odor from inlet and outlet pipe of gasholder was very bad. Sunday morning I went to work to find out what was wrong; suspecting my test papers, I tried the gas with nitrate of silver, litmus paper, both red and blue; sat urated some water and added sulphuric acid, etc., etc., the whole round of tests that I knew, and all told me the same story, while my nose (and after complaints of customers) told me the gas was very bad. I then applied myself to the purifiers, opened all and could find only one thing unusual or wrong; the lime instead of being colored yellow, or green, was purely white and red (little darker than the stamp on this envelope), white on top, and reddening until it reached the iron tray, where it was intensely red, showing clearly that the iron of the tray readily combined with the impurity. The only relief I have found, is in changing the purifiers twice as often as usual. I am very desirous to know the nature of the impurity, which must have been from the coal; although close examination failed to discover anything unusual.

Push along the matter of taxes on gas—let us have action taken as quickly as possible. One of the brethren, in your issue of the 16th inst., seems to think there is a desire to form a "ring." I have only seen the expression of a desire to have a large ring of gas companies make an effort to rid themselves of this unjust discrimination. Yours truly, MACHINIST.

[Will some of our gas experts please explain this phenomenon?—EDS.]

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What Oil Meal is Composed of.

PENN YANN, N. Y, March 3, 1869.

Messrs. Editors: In answer to yours of the 1st inst., I will state that the *oil meal* we use is from *flax seed*, after the oil has been taken from it. I will also state that for a short time we were out of oil meal, during which time our gas gave a very bad and strong scent, but on our using the oil meal again it soon disappeared, all through the same process of purifying with lime.

The purer the oil meal is, so much the better. In this part of the State we have oil meal manufactured from pigeon weed, cockell, and other kinds of seeds; but that manufactured from flax seed is the best.

Yours truly, C. C. MASTEN,
Sup't Penn Yan Gas-Light Co.

Fodell's System of Bookkeeping.

The following subscriptions to "Fodell's System of Book keeping for Gas Light Companies" have been received, making in all 58:

O. H. Butler, Maiden Lane, N.Y.
George Wood, Mellville, N. J.
I. N. Stanley, Gas Eng'r, Brooklyn, N. Y.
John C. House, Waterford Gas Co., N. Y.
J. W. & J. F. Starr, Camden Iron Works, N. J.
Robert G. Jordon, Wheeling, West Va.
Wm. Cartwright, Sup't Oswego Gas Works, N. Y.
George A. Dyer, Main street, Ellsworth, Me.

Smedberg's "Synopsis of Gaslighting."

The following subscriptions to the above work is acknowledged, making in all 205:

John Kirkham, Logansport, Ind.
Robert G. Jordan, Wheeling, West Va.

To Purify a Room.—Set a pitcher of water in a rrom, and in a few hours it will have absorbed all the respired gases in the room, the air of which will become purer, but the water utterly filthy. The colder the water is, the greater the capacity to contain these gases. At ordinary temperature a pail of water will contain a pint of carbonic acid gas and several pints of ammonia. The capacity is nearly doubled for reducing the water to the temperature of ice. Hence water kept in a room a while is always unfit for use. For the same reason the water from a pump should always be pumped up in the morning before any of it is used. Impure water is more injurious than impure air. The above, if true' proves how exceedingly careless many of us are as regards our health for we venture to say that a large majority of the people use water for drinking which has "absorbed" for hours the noxious gases of their rooms. Much care is requisite to preserve health.

Gas Question.

MONEY HELD AS DEPOSITS BY NEW YORK GAS COMPANIES.

ALBANY, March 10, 1868.

Three of the New York gas companies have responded to the resolution of the House requiring them to inform the Legislature as to the amount of money they hold on deposit from consumers. The Harlem Company report that they hold $12,843 of deposits over $3,000 of which were received from parties who have left the city and ceased to burn gas. The Metropolitan Gas Company report $117,197, which they claim as all they have to secure them for $170,0000 due the company. The Manhattan Company report their deposits at $230,-578. These amounts do not represent as much as was supposed. Mr. Mitchell, the chairman of the special committee investigating the affairs of the gas companies, is preparing a bill based upon the testimony taken, which, it is said, will be perfectly fair both to the interests of the consumers and the gas companies. It will not be presented until the investigation, which will be resumed on Saturday, is completed.

FURTHER INVESTIGATION BY THE LEGISLATIVE COMMITTEE IN BROOKLYN.

The committee resumed its inquiry March 10th at 10 o'clock, Mr. Mitchel presiding.

Mr. Valentine T. Wall, Secretary to the Old Brooklyn Gas Light Company, stated that the company's stock at present was $2.000,000, and in case they had to replace their capital now it would cost them $4,000,-000; their charge for gas was $3 25 a thousand; its light was equal to that of fifteen candles; sometimes went as high as eighteen or nineteen; the dividend for the past four years averaged about seventeen per cent.; he repudiated an assertion made by a customer, a few days ago, as to his being exhorbitantly charged by the company.

Mr. P. Libby, of the Citizens Gas Company, gave account as to price of gas dividend, etc., and said that inferiority in gas may arise from local obstructions; and opinion prevailed in Europe, as well as in America, that a gas company was in itself a monopoly; in Glasgow, where the illuminating power was equal to thirty candles, there was also a cry against monopoly; such a thing as gas monopoly did not exist, it being more ideal than real.

Charles T. Catiltine, of the Citizens' Gas Company, and Charles F. Blodget, of the Williamsburg Gas Company, were also examined, and gave testimony as to the past and present condition of their companys. The Williamsburg company charged $4 per thousand for gas, and this large price was attributable to the fewness of customers.

The chairman announced that the committee would meet in Brooklyn at 7½ o'clock on Saturday evening, to hear the complaints of customers.

Prices of Gas Coals—March 27.

PROVINCIAL.

Duty, $1 25	Coarse. Gold.	Slack. Gold.
Block House	$1 75	$0 75
Gowrie	1 75	0 75
Lingan	1 75	0 75
Sydney	2 13½	0 71½
Pictou	2 13½	1 18½
Little Glace Bay	1 75	1 00
Caledonia	1 60	0 75

AMERICAN.

	Coarse. Currency.	Slack.
Westmoreland Co.	$8 50	$8 00
Despard Coal Co.	8 50	8 00
Penn	8 50	8 00
Newburgh Orrel Gas.	8 50	8 00
We t Fairmount Gas Coal		7 00
Powelton Gas Coal	8 00	7 00

Delivered in New York.

PRICES OF FOREIGN COALS—DUTY $1.25 PER TON.

Liverpool Gas Caking	$ 9 50
" " Cannel	14 00
" House Cannel	18 00@19 00
" " Orrel	16 00@18 00

Per ton 2240 lbs., Ex. ship.

PRICES FROM YARD.

Liverpool House Orrel, scr'd	$16@$18
" Cannel, scr'd	18@$22

Per ton, 2000 lbs. delivered.

A vein of Bituminous Shale, which burns like cannel coal, has been discovered near Elko, on the Central Pacific Railroad. It forms an excellent fuel for steam purposes, and as it is apparently inexhaustible, with every prospect that the quality will improve, its value can hardly be overestimated. The deposit is not more than a mile and a quarter from the railroad; and it is found in a region where wood is selling at $10 per cord, and is not abundant at that price. The cost of mining and delivery on the line of the road will be about $4 per ton; and it is estimated that one ton of this shale or coal is equal in value to two cords of wood of the quality sold in the same region. Thus, in the place of two cords of wood at $20, the Railroad Company will obtain the same amount of fuel for steam purposes at $4. In view of the immense requirements of the road, the difference will be a most important item.

ARCHER & PANCOAST M'F'G CO.

Manufacturers of

GAS FIXTURES,

Coal Oil Lamps, Chandeliers, Etc.,

Of Every Description.

Manufactory & Warehouse, 9, 11 & 13 Mercer St.,

212) NEW YORK.

P. P. DEILY, J. FOWLER.

DEILY & FOWLER,

39 LAUREL STREET, PHILADELPHIA, PENN.,

BUILDERS OF GAS-WORKS,

MANUFACTURERS OF

GAS-HOLDERS,

WROUGHT IRON ROOFS,

CHARGING-SCOOPS, COAL WAGONS,

COKE BARROWS, AND ALL WROUGHT

WORK CONNECTED WITH GAS-WORKS.

Particular attention paid to the Extension of Works and Repairs to Gas-Holders, Purifiers, Etc. Also, Builders of Water Tanks, Oil Tanks, Oil Stills, Etc.

REFER TO M. H. Jones, Easton Gas Co., Penn.
Franklin Woolman, Burlington Gas Co., N. J.
O. W. Goodwin, Camden Gas Co., N. J.
Benjamin Acton, Salem Gas Co., N. J.
Dr. Marcy, Cape Island Gas Co., N. J.
W. F. Warner, Owego Gas Co., N. Y.
E. Wilcox, Joliet Gas Co., Ill.
Messrs. Woodbury, Walter & Potter, Kalamazoo Gas Co., Michigan.
H. H. Fish, Utica Gas Co., N. Y.
W. J. Ball, Terre Haute, Indiana. (221-1yr.

GAS-WORKS FOR SALE.

WE, THE UNDERSIGNED, PROPRIETORS OF the Gas Works of this place, on account of being desirous of engaging in business at some other place, offer the works for sale on liberal terms The Works are in good running order. Tamaqua, Pa., is a thriving business place in the coal region. There is in construction a new railroad to pass through this place, intersecting with the Lehigh Valley Railroad. For further information relating to the same, apply to German, Zehner & Co. 4t

TO GAS COMPANIES.

A YOUNG AND ACTIVE MAN DESIRES A situation as Superintendent of a small Gas Works. He is acquainted with machinery practically, and has had some experience in the details of gas making, distribution and meters- Can give the best of reference. Would take a situation as Assistant Superintendent, if desired. Address, "S," care of AMERICAN GAS-LIGHT JOURNAL 222-tf

NOTICE.

Fodell's System of Book-keeping for Gas Light Companies

WILL BE READY ON OR ABOUT THE 10th INST.

The Price to others than original subscribers will be $5.

OREGON IRON FOUNDRY,

738, 740, 742 and 744,

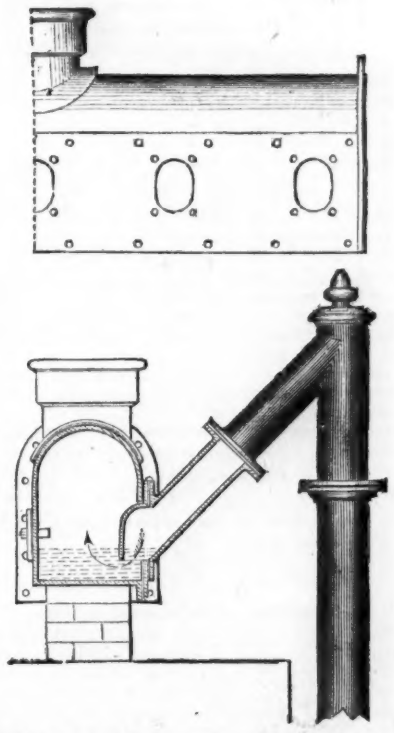
Greenwich Street, New York.

CASTINGS FOR

GAS WORKS

OF ALL DESCRIPTIONS, INCLUDING

Purifiers, Exhausters, Compensators, Self-Acting Valves, Branches, Bends, &c.



Floyd's Patent Adjustable Main.

R BENCHES OF 1, 2, 3, 5 and 6 RETORTS.

By the removal of the front plate only the Main can be adopted to Settings of any number of Retorts desired. The Patent Main can be applied to the ordinary D shaped Main. It offers great facilitie for cleaning, and is not liable to stoppage.

FLOYD'S PATENT

Malleable Iron Retort Lid.

SABATTON'S PATENT

Furnace Door and Frame.

REFERS TO—J. A. Sabattan, Esq., Engineer Manhattan Gas Co—Col. A J. White, Metropolitan Gas Co.—C. C. Mowten, Engineer New-York Gas-light Co.—J. Mowten Saunders, Engineer Baltimore Gas Co.—John T. Harrison, Engineer Savannah Gas Co.

.86] HERRING & FLOYD, Proprietors

SILAS C. HERRING. JAMES R. FLOYD

PORTABLE GAS WORKS.

JUST ESTABLISHED,

AT NO. 554 BROADWAY, NEW YORK,

A GENERAL AGENCY FOR THE SALE OF THE CELEBRATED

Springfield Gas Machines.

So well and favorably known throughout New England. Illustrated Circulars giving full particulars, with references to the NATIONAL ARMORY OF THE UNITED STATES,

At Springfield, Mass., which is now lighted with this Apparat of a thousand burner capacity; and some others who are usi these Machines, will be mailed upon request. Address

COVELL & CO.,

No. 90 Crosby Street, and 554 Broadway, N. Y.

A MIDDLE-AGED MAN OF BUSINESS HABITS for many years engaged in Machinery, particularly that connected with Gas and Water Works, Plumbing and Gas-Fitting, about starting on a Tour through the Western States, will act as Agent for anything in the above line. Undoubted reference given. Address Box 1,513, P. O., New York. 219-2

THE

AMERICAN GAS-LIGHT JOURNAL,

AND

CHEMICAL REPERTORY.

Published on the 2d and 16th of Each Month

At No. 22 Pine Street, New York.

M. L. CALLENDER & CO.,

EDITORS AND PROPRIETORS.

Consulting Chemist,
Geologist and General Scientist,
PROFESSOR HENRY WURTZ.

[NOTE BY PROFESSOR WURTZ.—Contributions and items for which I am, as a Scientist, individually responsible, will have attached my full name or initials.—H. W.]

FRIDAY, APRIL 2, 1869.

WISHING TO MAKE this Journal an organ of intelligent discussion to those of our readers who may wish to gain or give information on the subjects to which its columns are devoted, the publishers solicit letters from all among them who make the study of those subjects a pleasure, or a profession.

Subscribers would confer a favor upon us by remitting *CHECKS* or *POST OFFICE MONEY ORDERS*, as we are frequent losers where money is enclosed in letters.

☞ NEWS AGENCY.—The American News Company, 119 and 121 Nassau street, New York, are agents for this Journal. Newsdealers will please send orders to them.

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NOTICE.

☞ *All Collections for Advertisements, Subscriptions, etc., are made directly from this Office. We have Agents to solicit the same, but they are not authorized to Receipt for Money.*

TO OUR SUBSCRIBERS AND PATRONS.

In making remittances for subscriptions, always procure a draft on New York, or a POST OFFICE MONEY ORDER, if possible. Where neither of these can be procured, send the money, but always in a REGISTERED LETTER. The registration fee has been reduced to fifteen cents, and the registration system has been found by the postal authorities to be virtually an absolute protection against losses by mail. ALL Postmasters are obliged to register letters whenever requested to do so.

Answers to Correspondents.

B. P. & F., Omaha.—The iron process for purifying gas is adapted to the ordinary dry lime purifyers and apparatus generally used by gas companies throughout the United States. It runs at about the same pressure as lime. The material used is considerably heavier bulk for bulk.

L. H. P., of Ohio.—Locomotive cylinders are made of various diameters; the most general are from 18 to 20 inches by the same length of stroke. Some very heavy locomotives have 22 inch cylinders.

J. W., of Iowa.—You will find it very difficult to remove the scale from the inside of your steam pipes. A strong solution of soda is used in England with some success, but we cannot speak practically of its virtues.

A. M. R., of Mo.—A great many patents have been granted in this country and in England for water meters; but thus far they have not been brought much into use.

FACTS ABOUT GAS FOR THE PEOPLE.

It is surprising to a reflective mind to note the amount of ignorance that generally prevails among consumers of gas, as to its proper and economical use, and more especially if the observer is fully acquainted with the laws which govern the flow of gas through its various conductors, and its combustion. No other article of general consumption is used so carelessly and wastefully. If any staple, such as flour, sugar, tea, coffee, etc., was squandered and lost to half the extent of gas, and from the same causes, it would be considered a matter of national interest; and as a means of political economy, laws would be framed to instruct the people how to economize in those staples so as to obtain the greatest benefits therefrom. Every paper in the land would take up the question, and scientific writers would be called upon to investigate and give the public the benefit of their researches.

It is safe to say that nine-tenth of the consumers of gas do not get over one-half or two thirds the value in light, which the gas they receive and pay for is capable of yielding, if it were used so as to get its full equivalent of illumination.

DIFFERENT PRESSURE.

The conditions governing the proper management of gas are very various. The consumers of gas on the same street, and even in the same building, have their gas delivered under different physical conditions, and necessarily, must burn it in a different manner, in order to get its full value.

If the sewer pipe leading from the street is too small, the pressure will be too low at the burners, and the light will be feeble and changeable; if the pipes be large, the gas will issue at the burners with too much force to obtain the complete benefits of illumination, and will require a check at the meter or at the burner. Not a fixed check, such as a stop-cock affords, but an automatic check or regulator, which will allow the gas to flow at the burner at a uniform rate, when the pressure varies, (as it often does) in the street mains.

The consumer in the basement or first floor will have less pressure than the floors above. The increase in pressure is about one-tenth inch greater water pressure for each floor. Now it is an established fact that a burner consuming five feet of gas (for instance) at four-tenths pressure, will consume over one-half of a foot more for each additional tenth of pressure. Hence it will be readily understood why the consumers on the top floor of a house will burn about fifty per cent more gas than the consumers on the first floor, while the increase in light is very trifling. The same rule holds good in all elevated places, so that, in some cases, the consumer may loose from fifty to eighty per cent of the illumination due from the gas which passes the burner at a high pressure. In the lower part of the city of New York the pressure is always low. At Murray Hill it is always high; a difference against the consumer (if not provided against) of about forty per cent.

CONDENSATION AND DETERIORATION.

A Gas Company may manufacture and deliver gas from the works, in good faith, of eighteen candle power; and yet the consumer, after providing against pressure, loss, etc, may not get gas of over twelve or fourteen candle power. This is owing, principally, to the loss by the deposit of the condensable hydro-carbons, which so materially make up the illuminating power of gas. If the gas passes through a very cold temperature, it condenses rapidly. It condenses also at common temperature, when passed long distances, or through very small pipes or passages. Hence it is, the consumer a few rods from a gas works may never complain of dim gas-light, while the consumer a mile or two distant cannot expect to luxuriate in such effulgent rays as his friend near the gas works.

Other causes produce condensation, and deterioration of gas. It is definitely ascertained that gas passing over an extended metallic surface, looses some of its hydro-carbons, where low temperature is not the active agent, but rather a kind of adhesion similar to the phenomenon of capiliary attraction. This result is apparent when gas is passed through metallic wire screens with very fine meshes. It is more apparent, perhaps, when passed through iron or brass filings or metallic ores, where the particles are very irregular and porous.

REMEDIES.

Where the gas is of low candle power from any cause, and the pressure is not low, it may be remedied by using burners with inner and outer jets or apertures; the inner aperture being much smaller than the outer aperture or exit, and combined with an expanding chamber. This allows the gas to become gradually heated and expanded in volume, and as as the exit is free and open, the flame is expanded, and the carbon comes in contact with the atmosphere slowly, giving more time for the combustion and extending the period of incandescence or illumination. Another plan is to use burners with large jets, having a little wool or cotton placed loosely in the body of the burner, which partially answers the same purpose. The Billow or double jet burner is also a good burner for gas having low candle power. It consists of two fish-tail or bat's-wing burners, set so the flame impinge upon one another at an angle, producing a single flat flame. The regulator, or automatic valve-burner, is also valuable for the same purpose, with the advantage that it regulates the flow of gas under different pressures. The Johnson, the Gleason, Bogart, and Rounday burners are all adapted for the purposes first named, having an inner and outer jet, and expanding chamber, etc. The Thompson automatic controller or regulator burner, and the Avery burner are of the latter class.

Gas of low candle power should always burn from a *large jet* or *jets*, and at *low pressure*. This may be accepted as a general rule.

If Argand burners are used the orifices should be large, and the chimney short, to get the best results from gas of low candle power.

Of course it is understood that nearly all of the conditions regarding large orifices or jets to burners and double jets, etc., as mentioned above, will change in proportion as the gas increases in candle power.

[To be continued.]

SPECIAL NOTICES.

A GREAT INDUSTRY.—Few persons realize the great increase that has occurred in the last few years in those industries which arise from the manufacture and use of illuminating gas. Foremost in importance, perhaps, is the manufacture of the various portions of gas works which are constructed of iron. The various castings of retorts, stand pipes, hydraulic mains, furnace frames, and grates, etc., purifiers, washers, condensers, centre seals, valves, etc. Then comes the gas and steam piping, of cast iron, stops, connections—not forgetting the great reservoir of gas, the holder, whose huge and symmetrical proportions often o'er topple and eclipse even the gas house itself, and not unfrequently, we might say almost daily, becomes so *puffed up* in its own importance as to look down with contempt, as it were, upon all its surroundings.

Among the various establishments in this country who have made a reputation as manufacturers of gas pipe, and gas and water mains, stops, valves, connections, etc., and everything used for gas, steam, and water, may be mentioned Messrs. Morris, Tas-

ker & Co., Pascal Iron Works, whose office and warehouse is 209 South 3d street, Philadelphia, also at 15 Gold street, New York.

These works, it is said, rank as the largest of the kind in the world, and contain every variety of apparatus and patterns for coal gas works, and have superior facilities for furnishing estimates on drawings or engineering plans.

☞ We are pleased to acknowledge the receipt of the Annual Report of the Inspector of Illuminating Gas, William E. A. Aiken, M.D., to the Mayor and City Council of Baltimore. A more extended reference to it will be made hereafter.

We also have received the thirty-fourth Annual Report of the Trustees of the Philadelphia Gas Works, for which our thanks are due.

Reports of this nature are always very acceptable, and we hope other Inspectors throughout the United States and elsewhere, will favor us by sending a copy of their Annual Reports, and we will not forget the obligation.

Gas-Lighting.—We learn that the Manhattan Gas-Light Company have purchased from Mr. J. W. Bartlett, 569 Broadway, the right to use his patent Torch and Improved Key for lighting and extinguishing the street lamps in their district. This is the most important improvement we have ever seen in the mode of lighting street lamps, and we predict that it will become very popular. See advertisement in another column.

☞ Messrs. B. S. Benson & Son, manufacturers of gas and water pipe and fittings, etc., have established themselves on a grand scale at Allentown, Pennsylvania, as will be seen by referring to their advertisement, on this page

We have the pleasure of personal acquaintance with young Mr. Benson, and can assure our readers he means *business*.

Gas Items.—A petition, quite numerously signed by the citizens of Malden, Massachusetts, is before the State Legislature for a new company in that place. Tha old company is experiencing the effects of laying too small mains. A portion of the town has been entirely without, or deficient in supply for the past two winters.

☞ We beg to refer our readers to the advertisement of Messrs. Deiley & Fowler, of Philadelphia, on page 295.

These gentlemen have lately taken the name and style of the firm, as above, owing to the association of Mr. Fowler. It was formerly P. P. Deiley. We feel assured the new firm are bound to make themselves "known by their works."

Increase of Capital Stock.—The following named Gas Companies, in Massachusetts, have applied to the Legislature to have an increase of Capital Stock: Charlestown, Chelsea, Jamaica Plains, and Northampton.

The Gas Question.—Owing to press of matter in this issue of the Journal, we will be obliged to deter the report of the proceedings before the Legislative Gas Committee until the next number, when we hope to give it *in extenso*.

NEW PUBLICATION.

Van Nostrand's Eclectic Engineering Magazine.—The crowded state of our columns for the past three issues, prevented us noticing this new publication that has been placed upon our table. It is certainly a neatly gotten up monthly, and reflects great credit on the publishers; it forms an important addition to the many other technical works published in this country. It abounds with a variety of carefully selected articles from the latest scientific works and papers, and embodies the latest facts, discoveries, and processes connected with the manufacture of iron and steel, which will be found useful to those interested in these subjects. We trust the magazine will receive that support it so richly deserves.

Errata.

In our last issue, in the editorial article on "Gas Coal," third paragraph, 12th line, for "$6.04" read $9.05.

DENNIS LONG & CO.,

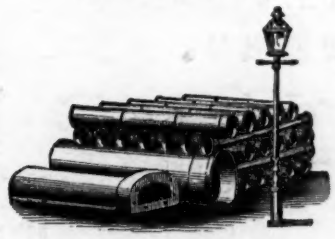
UNION PIPE WORKS!

LOUISVILLE PIPE FOUNDRY,

AND

Union Foundry and Machine Shops,

LOUISVILLE, KY.



MANUFACTURE

CAST IRON GAS AND WATER PIPE.

All Pipe Cast Vertically in Dry Sand.

2 inch Pipes in 8 feet lengths. 3 inch to 60 inch cast in 12 feet lengths.

RETORTS AND MOUTH PIECES, LAMP POSTS. CONDENSING PIPE, HYDRAULIC MAINS, PURIFIERS, DRIPS, ELBOWS, T'S, CROSSES, SLEEVES, VALVES, &c., &c., &c.

GAS-HOLDERS.

And every description of work necessary for Gas or Water Companies.

Steamboat and all kinds of Steam Engines Blacksmithing and Heavy Castings. 283

GLOUCESTER IRON WORKS,

GLOUCESTER, CAMDEN COUNTY, N. J.,

MANUFACTURE

CAST IRON GAS AND WATER PIPE, STOP VALVES FOR GAS OR WATER, GAS HOLDERS. 223

☞ *NEW METHOD*

FOR

LIGHTING AND EXTINGUISHING

Street and other Elevated Gas Lamps.

For Illustrated Circular containing particulars, with letter from the President of the Manhattan Gas-Light Company, and Superintendent of Lamps and Gas of the City of New York. address J. W. BARTLETT, Patentee of the American Self-Gas Lighting Torch and Improved Key, 569 Broadway, N. Y. 2 3

WANTED—A SITUATION BY A GAS ENGINEER of long experience, who understands all the details of Building, Extending, and Repairing Gas Works; is also a practical Gas Fitter. Address, "ENGINEER," Office Gas-Light Journal. 222

B. S. BENSON & SON,

ALLENTOWN, PA.,

MANUFACTURERS OF CAST IRON

GAS AND WATER PIPE,

AND FITTINGS FOR

GAS AND WATER MAINS, ETC.

Cast Vertically, in Lengths of 12½ Feet, and all Sizes from 3 to 30 inches.

Orders filled with Promptness and Despatch, and Warranted to give Satisfaction.

☞ Works and Office, Lehigh Valley, Allentown, Pa. 222-1yr

Youghiogheny Coal Hollow Coal Co.

OFFER THEIR

SUPERIOR GAS AND STEAM COALS

To Gas Light and Water Companies throughout the country.

John S. McMullin, Pres. Fred. B. Hubbell, Sec'y & Supt.

Office 423 Walnut Street, Phi'adelphia.

L. F. Mellen & Co., Agents, Cleveland, O.

Refer to following consumers:—Buffalo Gas Company, Detroit Gas Company, Peoples Gas Company, hicago, Fort Wayne Gas-Light Company, Brooklyn Gas Company, Jersey City Gas-Light Company, Cleveland Gas-Light Company.

LUDLOW VALVE MF'G CO.

OFFICE 139 RIVER ST., TROY, N. Y.

Make Valves ¼-inch to 24 inch, for Water, Steam & Gas.

FIG. 1.

Fig. 1 shows a single gate valve.

Fig. 2 represents wedge and one-half of gate.

Fig. 3, a section through body, gate and wedge, intended for larger sizes of water valves required to bear heavy pressure either side.

The slides, G G, are held against wedge D, by ribs, H H, projecting from sides of valve body, A.

In closing the valves, when opening I is covered, slides, G G, pass the lower ends of ribs, H H, when the wedge, D, can move forward on the inclined planes E E, and crowd the gates apart.

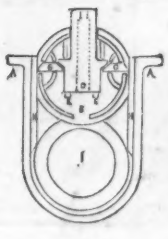


FIG. 3.

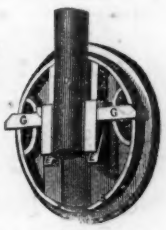


FIG. 2.

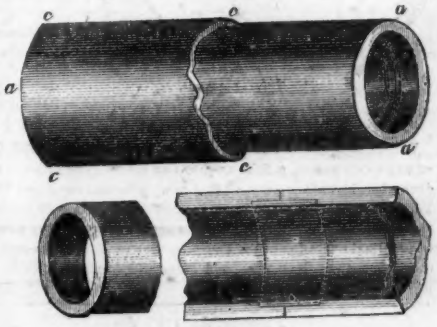
[From A. F. Havens, Engineer Brooklyn Gas-Light Co.]

"I take great pleasure in saying that they give perfect satisfaction—opening easily and quickly, and requiring no effort to start them, even after they have been closed for months."

[From R. E. Roberts, Secretary Detroit Water Works.]

"Commenced using your valves in 1866; have over 200 in use: have given satisfaction."

☞ More than 80 Gas and Water Companies have them. Send for Descriptive Circular.



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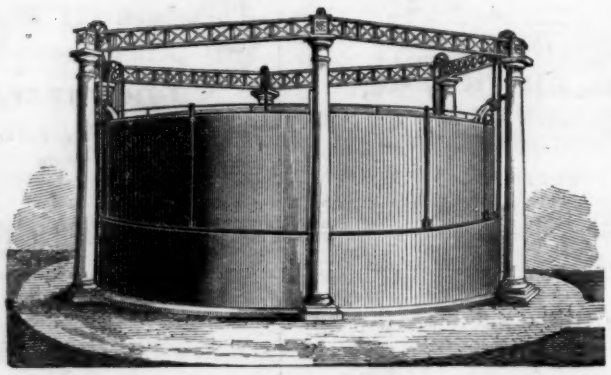

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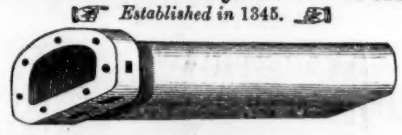

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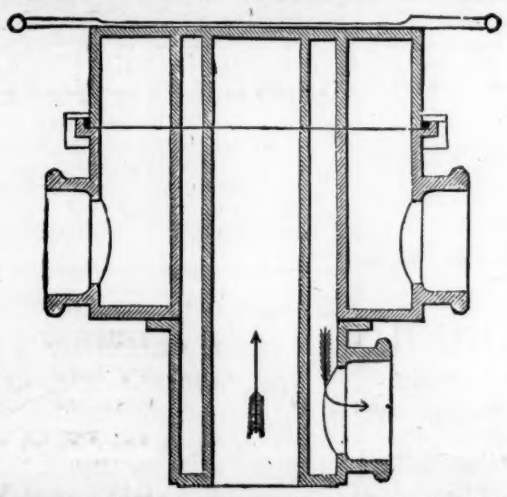

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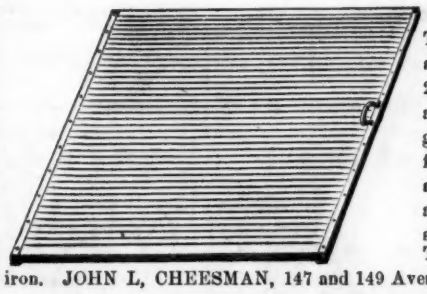

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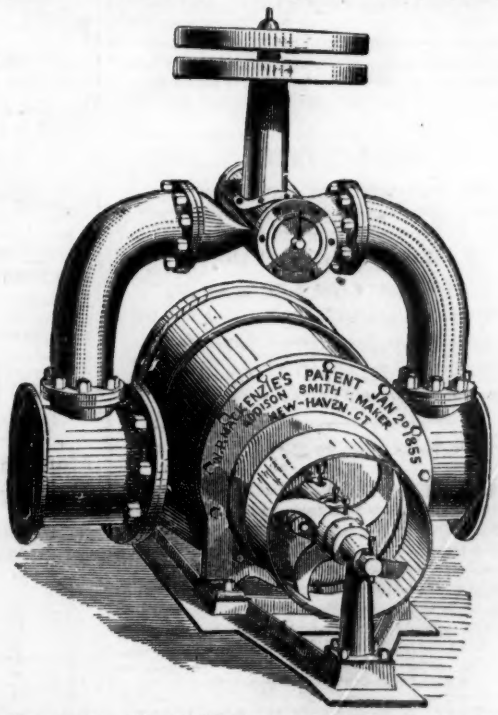

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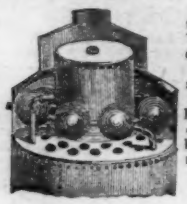

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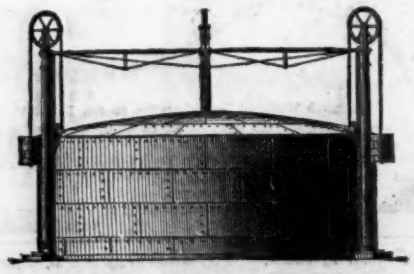

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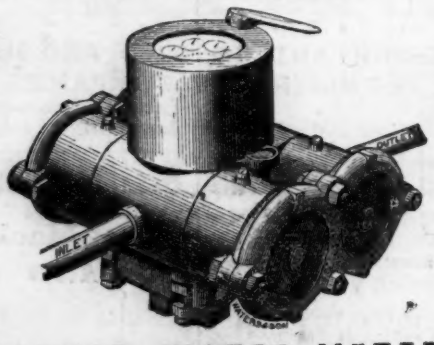

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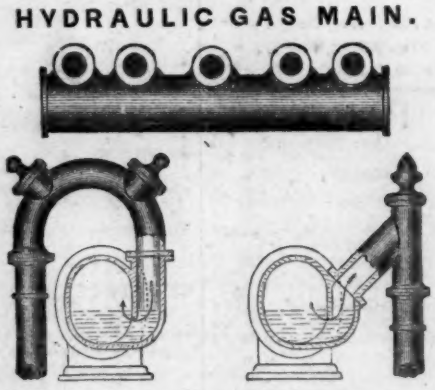

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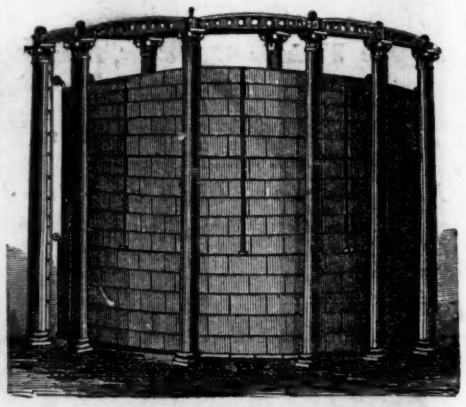

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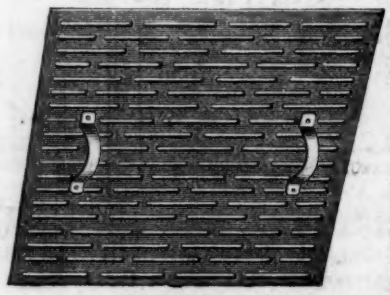

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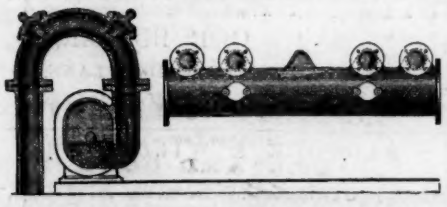

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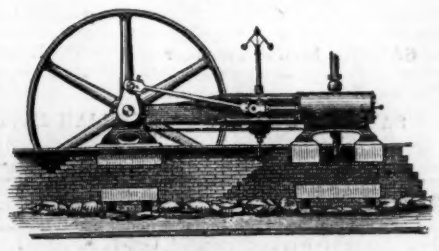

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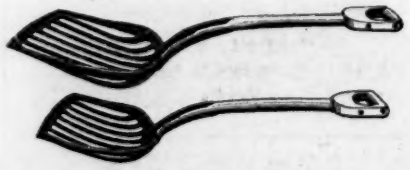

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Gas Fitters' and Plumbers' Materials—McNab & Harlin, 56 John street, New York. 3
Gas Coals—Bird, Perkins & Job, 104 Wall street, New York.
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Gas-Burners—C. Gefrorer, 529 Commerce street, Philadelphia, Pa. 9
Gas Meter Manufacturers—Harris & Bro., 1217 Cherry street, Philadelphia, Pa. 8
Gas Apparatus, &c.—Geo. H. Kitchen & Co, 561 Broadway. 9
Gas Burners—T. G. Arnold, 224 and 226 West 21st st., N. Y. 9
Gas Burners—W. Anderson, cor Franklin & Elm sts., N. Y. 8
Gas Stoves—A. L. Bogart, 792 Broadway 7
Gas Fixtures & Chandeliers—Alfred Bliss & Co., 95 Bleecker-st., New York. 4
Gasometers, Etc—George Stacey & Co. Cincinnati, O. 6
Gas-works of London—D. Van Nostraud, 192 Broadway. 3
Gas Fixtures, Etc.—Mitchell, Vance & Co., 697 Broadway. 3
Gasholders, Etc.—Daily & Fowler, 39 Laurel street, Philadelphia 3
Hydrocarbon Light and Gas Improvement Company, Office 74 Maiden Lane, New York. 3
Jersey City Gas Meter Works. 14 Morris st., Jersey, N. J 4
Ludlow Valve Mf'g Co., 139 River street, Troy, N. Y 3
Patent Gas Exhauster—Smith & Sayre, 494 Broadway. 5
Purifying Trays—Jno. L Cheesman, 147 and 149 Ave. C, N.Y. 2
Portable Gas Works—Covell & Co., 554 Broadway, New York. 3
Stanley's Hydraulic Main, Etc.—L. F. Whiting, Boston. 6
Valve Gas Burner—Avery & Co., Springfield, Mass. 3
West Fairmount Gas Coal Mines, Office, Baltimore Md. 2
Wooden Gas and Water Pipe—Wyckoff Bros. & Co., Elmira. 3

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Laclede Fire Brick Works, 1007 North Levee, St. Louis, Mo. 8
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Empire Sewing Machine Company, 294 Bowery. 6
Finkle & Lyon Sewing Machine Company, 581 Broadway. 9
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Professor Henry Wurtz—Office Gas-Light Journal. 3
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Patent Lamp Post—Am. Gas-Light Journal, 28 Pine street. 4
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☞ All communications to be addressed to "The Editors," No 22 Pine Street, New York.

JUNE 29, 1869.